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CONTENTS

VOLUME 8, NUMBER 8 AUGUST 1987

commodore MAGAZINE

DEPARTMENTS

FEATURES





LETTERS



Type-in Programs

To the Editor:

I tried typing in the Falcon and the Enemy game from the April issue of your magazine, but when I run it I keep getting an OUT OF DATA ERROR in line 10. What gives? Don't you guys proofread the programs before you put them in the magazine?

John Steinman
Camden, New Jersey

Our Technical Editor answers:

Much care is taken to ensure that the program listings that appear in the magazine are correct. After running and testing the program, it is listed to a letter-quality printer. The listing is then photographed and pasted down in the magazine. In this way, no errors are introduced in the printing. 95% of the time the error you get when typing in the program is a typing mistake. Although the Magazine Entry Program catches almost all of the errors, it is sometimes still possible to make a mistake typing. A common error, which may be the case in your problem, is a missing program line. Check your DATA lines again carefully (lines 4601-5025) to be sure you haven't forgotten one.

Computers for Sick and Injured Children

To the Editor:

As members of the Upper Peninsula Computer Users Club, we are always looking for projects which will promote the image and use of Commodore computers. Recently, the club members approved a project which we feel will not only accomplish this goal, but also create good feelings in our community. We are so excited about the project that we would like to share this idea with others.

We are providing a computer-related service to sick and injured children. The members of our club are donating computer equipment and software to the pediatric departments of the two hospitals in Marquette County, Michigan. These two hospitals are Marquette General Hospital in Marquette and F. A. Bell Memorial Hospital in Ishpeming.

We feel that children who are sick or injured often lack the energy or ability to actively engage in play. Being cooped up in a small area or restricted in bed leaves a child with too much time along. Too often a child will build up fears and anxieties when nothing occupies their attention and imagination. The need for constructive activities and mental stimulation can find an excellent outlet through the use of Commodore 64 and 128 computers and appropriate software.

To this end, we have been writing to various hardware and software suppliers, seeking donations in the form of hardware, programs and peripherals which could be used at both hospitals. These systems will be set up on wheeled bedside tables, which the nurses can bring into a child's room to provide play and entertainment—perhaps introducing computing to a young person for the first time. This takes a negative situation, that of hospitalization, and brings something positive into it. We have received a lot of encouragement from the hospitals themselves for this project, as well as a favorable response from a number of national suppliers of software. For our project to be successful, however, there is more to be done.

We believe this to be a very worthwhile project, whose possibilities are endless. It will increase the awareness of Commodore computers, help alleviate anxiety and suffering of young hospitalized children, and even offer a promotional possibility for the suppliers of the software. There are many game programs that can be used in physical therapy, such as *Comet* from BodyLog. All in all, we have become very excited about our project and are hoping your readers will feel the same. Any ideas, thoughts, and of course, donations, are very welcome. Perhaps other Commodore clubs in other areas would like to try similar projects in their communities.

Many people feel that the computer is a cold machine. Our project will use that cold machine to warm the hearts of many children.

David Kugler
President, UPCUC
610 East Ridge Street
Ishpeming, MI 49849
(906) 486-9649

STAFF

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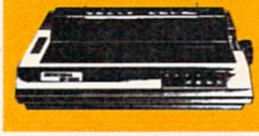
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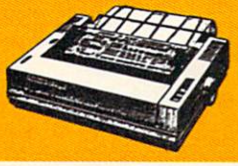
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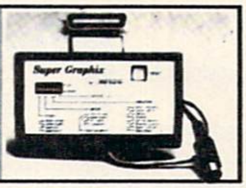
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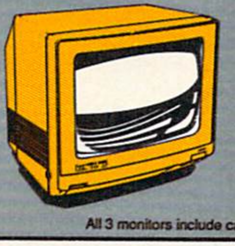
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NEWS

Terrorpods

From Psynosis for the Amiga is the strategy arcade game called **Terrorpods.** The object here is to defeat the invading Tripod forces. Action takes place against a 3D playfield that scrolls past in perspective. All defensive and offensive manuvering is a race against the clock. Ultimately your goal is to destroy the Tripods and their mothership. But along the way you'll be involved in trading, resource management, and defense of your ship as well as your base of operations. According to Psynosis, the game winning strategies are almost endless. It retails for $39.95.

For more information, contact Psygnosis Limited, First Floor, Port of Liverpool Building, Liverpool L3 1BY, UK. Or call: 051-236-8818

The Sentry

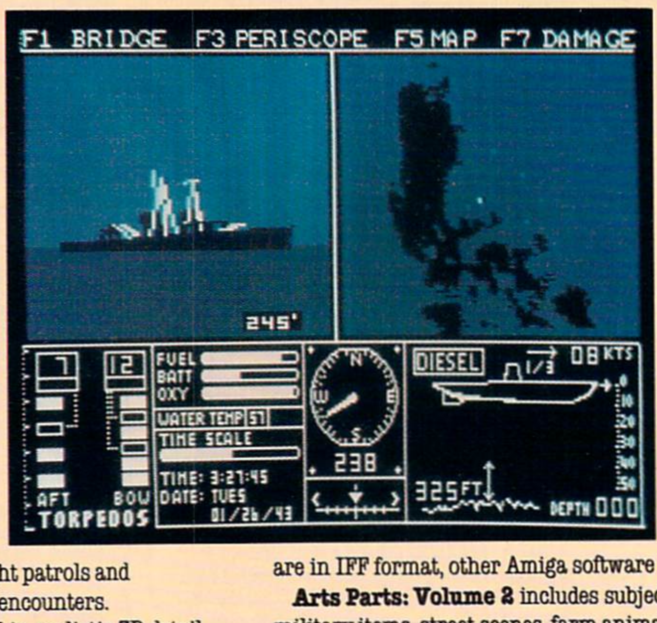
New for the Commodore 64 from Firebird, is the strategy adventure game called **The Sentry.** In this game, the player is stranded on a planet made from over 10,000 sureal landscapes with 3D graphics.

The object of the game is to use your lone robot to battle and win against the Sentry and her legion of Landgazers so that you can usurp her thrown and become the new ruler of a particular alien landscape. Once you control one scape, you move up to another more challenging setting and continue your struggle for total planetary domination.

The game is priced at $39.95. It's disk-based and comes with an illustrated booklet, quick-reference guide, and a pin-on Sentry button. For more information, contact Firebird, P.O. Box 49, Ramsey, NJ 07446. Or call: (201)-444-5700.

Up Periscope!

Newly released for the Commodore 64 from ActionSoft, **Up Periscope!** puts you in command of a WWII fleet-class submarine. Your mission, which you don't have any choice in selecting because you're in the Navy, is to patrol the Atlantic and Pacific theaters of World War II.



The game lets you recreate 14 actual historical sea battles or you can go hunting for enemies on your own. There are night patrols and more dangerous daylight periscope-depth encounters.

Both Allied and Axis forces are depected in realistic 3D detail, courtesy of the folks at SubLogic. Targets include freighters, tankers, troop ships, destroyers and battleships. Your equipment includes surface and attack radar, variable power periscope, torpedo data computer, and ocean charts.

Up Periscope! is available for $29.95. For more information, contact ActionSoft, 201 West Springfield Avenue, Champaign, IL 61820. Or call: (217) 398-8388.

Word Writer 3

Timeworks has just released its most powerful easy-to-use word processing system for the Commodore 64—**Word Writer 3.** Features of this updated program include an 85,000-word spell checker with unlimited sub-directories; an integrated 60,000 synonym thesaurus; an integrated outline processor, 80-column print/preview mode; highlighting for bold, italic underline, super/sub-scripts, headers and footers; GEOS compatibility; "SwiftKeys" for quick access to commands; and automatic program parameter set-up.

Word Writer 3 can be used on its own or in conjunction with other Timeworks' products. For more information and pricing, contact Timeworks, 444 Lake Cook Road, Deerfield, IL 60015. Or call: (312) 948-9200.

Mouse Cleaner 360°

For everyone who owns a mouse, Ergotron has released a low-cost mouse cleaning kit called **Mouse Cleaner 360°.** The kit consists of a Velcro™ covered ball, a scrubber board, a lint free chamois, and a bottle of cleaning solution. The product retails for $16.95. For more information, contact Ergotron, Inc., 1621 East 79th Street, Bloomington, MN 55420. Or call: (800) 328-9839.

New Clip-Art Disks

Electronic Arts has released two new artwork collections for Deluxe-Paint II, DeluxePrint and DeluxeVideo on the Amiga. These two disks, called **Arts Parts: Volume 2** and **Seasons & Holidays** provide over 200 specially designed color brushes and clip-art images. Because all the images are in IFF format, other Amiga software can also use them.

Arts Parts: Volume 2 includes subjects such as stars, planets, military items, street scenes, farm animals and human faces. **Seasons & Holidays** includes New Years, Valentine's Day, Easter, Halloween and Christmas as well as birthdays, weddings and parties.

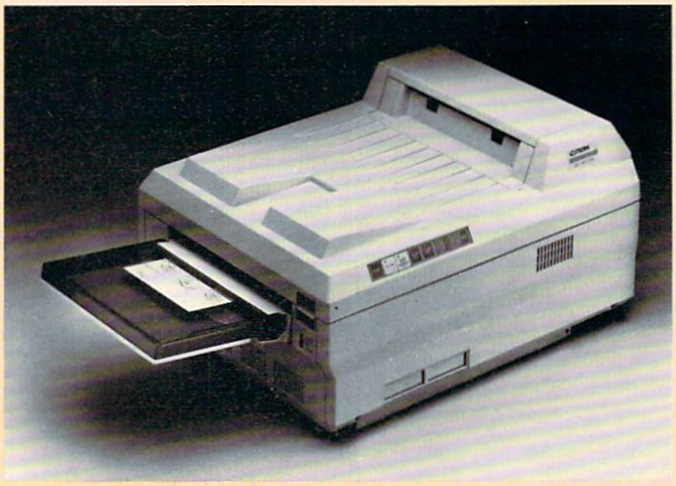
Price of either disk is $29.95. For more information contact Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. Or call (415)-571-7171.

Advanced Dungeons & Dragons

Strategic Simulations, Inc. has signed a five-year licensing agreement with TSR, Inc. for exclusive world-wide rights to the Advanced Dungeon & Dragons fantasy role-playing game. These TSR games will be available on computer for the first time in early 1988. SSI is planning at least ten different games for the Commodore 64/128 and the Commodore Amiga based on **Advanced Dungeons & Dragons**.

For more information and pricing, contact Strategic Simulations, Inc., 1046 N. Rengstorff Ave., Mountain View, CA 94043-1716. Or call (415)-964-1353.

Jet-Setter Laser Printer



C. Itoh Digital Products has introduced **Jet-Setter,** a new low-cost laser printer for the PC 10 and Amiga user. **Jet-Setter** prints up to five pages a minute with a resolution of 300 dots per inch. Standard features include HP LaserJet Plus emulation, 512K of memory, Centronics parallel, RS232C serial and RS422 interfaces, and a 100 sheet paper tray. Optional features include expanded memory to 1.5 Megabytes, Diablo 630 and Epson FX-86e emulation cartridges and a library of 11 font cartridges.

Jet-Setter is available for $1795, which includes the printer, toner, quick reference card, user's manual and one year warranty.

For more information contact C. Itoh Digital Products, Inc., 19750 South Vermont Avenue, Suite 220, Torrance, CA 90502. Or call (213)-327-2110.

Disk-2-Disk

Central Coast Software has just released **Disk-2-Disk** for the Amiga, which transfers files between the C64/128 and the Amiga. Using the Amiga and a 1020 external 5.25-inch drive, you can transfer 1541, 4040 and 1571 files to the 3.5-inch Amiga drive. **Disk-2-Disk** supports sequential, program, relative and user files and will translate between Commodore PET ASCII and standard ASCII. Features include TYPE and DELETE commands, VALIDATE BAM and CHECK DISK utilities and the ability to use AmigaDOS wild cards.

Available for $49.95 from Central Coast Software, 268 Bowie Drive, Los Osos, CA 93402. Or call (805)-528-4906.

Uptime

From Viking Technologies comes a monthly disk-based publishing venture for use with the Commodore 64 called **Uptime.** Each month subscribers receive eight new programs: home management, education, games/adventures, tutorials, and utilities. In addition they offer product and software reviews. For more information and pricing, contact Viking Technologies, Inc., 174 Bellevue Avenue, Newport, RI 02840. Or call: (800) 437-0033.

Sky Runner

Sky Runner, an arcade adventure game has been released by UXB, the arcade division of Spinnaker Software. As a **Sky Runner**, you are responsible for the protection of mankind from a deadly drug called SKY. The object of the game is to destroy the huge SKY harvesting machines and their surrounding defense towers. The player uses the joystick to maneuver two types of assault vehicles, jet skimmers and Sky Bikers. Each successful operation gains the player bonus funds.

Available for the Commodore 64/128 for $29.95. For more information contact Spinnaker Software, One Kendall Square, Cambridge, MA 02139. Or call (617)-494-1200.

Superstar Ice Hockey

Mindscape has released **Superstar Ice Hockey,** a one or two player ice hockey simulation for the Commodore 64/128. On the ice, you can use a joystick to control either the goalie or center and can shoot, pass, block and hip-check opponents. Off the ice, as coach and manager, you can set up and rotate player lines, trade and draft players and send players to training camp.

The price of **Superstar Ice Hockey** is $34.95. For more information contact Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062. Or call (312)-480-7667.

LexCheck

C.D.A., Inc. has announced **LexCheck,** a spelling checker for the Amiga. **LexCheck** works with files created by Textcraft, Scribble! and Notepad as well as standard ASCII files. With 100,000 words on disk, **LexCheck** uses only 100K of memory, allowing it to multitask with other software. User dictionaries can be created, and options include either checking an entire file or looking up a single word.

LexCheck is available for $42.95. For more information contact C.D.A., Inc., P.O. Box 1052, Yreka, CA 96097. Or call (916)-842-3431/5757.

NEWS

Math Blaster and Word Attack Workbooks

From Davidson & Associates comes a new line of workbooks designed to supplement their award-winning **Math Blaster** and **Word Attack** programs. The workbooks can be used with the software or alone for drill and practice in the appropriate skill areas. Each workbook contains a variety of activities, exercises, and interesting characters to help build basic skills.

Designed around the same developmental structure as the software, each workbook follows the three-step formula of tutorial, reinforcement and application. The **Math Blaster** Workbooks cover grades 1-4 and **Word Attack** Workbooks cover grades 2-4. Both skill areas offer three workbooks per grade level.

For more information and pricing, contact Davison & Associates, Inc., 3135 Kashiwa Street, Torrance, CA 90505. Or call: (213) 534-4070.

Micro Detective

From the mind of Bennett Cookson Jr., long-time author of *Commodore Magazine* articles, comes **Micro Detective,** a unique debugging system for BASIC for the Commodore 64. According to its author, the program features auto-error detection, advanced tracing, and numerous other programming tools.

Instead of terms like "?SYNTAX," the program offers messages like "expected a comma" or "variable must start with a letter." In addition the system actually looks for and highlights errors. The program lists for $49.95 with quantity discounts available. For more information, contact American Made Software, P.O. Box 323, Loomis, CA 95650.

Grade Manager

Associated Computer Services has introduced a new grade reporting and student maintenance program for teachers with Amiga, 64, 128 and PET computers called **Grade Manager.** The program is designed to make accurate recording and reporting of students grades fast and easy. **Grade Manager** supports eight grade weighting categories, 100% point scale conversions, two extra credit systems and incompleted coursework for up to 100 students each with 100 different grades. For more information and pricing, contact Associated Computer Services, 1306 E. Sunshine, Springfield, MO 65804. Or call: (417) 887-7373.

Quiz Master

A teacher's aid from Associated Computer Services for use with the Amiga is **Quiz Master.** This program lets you create an unlimited number of tests, tutorials or drills for both individuals and groups. Formats include true/false, fill in the blank, multiple choice, and answer the question. And it allows for up to 15 different but correct answers to each question. Plus it offers music and graphics capabilities for those specific applications which require them. For more information and pricing, contact Associated Computer Services, 1306 E. Sunshine, Springfield, MO 65804. Or call: (417) 887-7373.



Powerload

From Jance Associates comes a new product for the Commodore 64, **Powerload.** Designed to be used in conjunction with the Powerhouse Computer Interface Controller Model CP290, **Powerload** features include loading 128 Powerhouse events in less than 3 minutes, printouts of all events stored in the Powerhouse Controller, direct control over the entire Powerhouse interface, and it's menu-driven instead of joystick- or cursor-controlled. The suggested retail price is $20.00, and includes software on disk and full documentation. For more information, contact Jance Associates, P.O. Box 234, East Texas, PA 18046. Or call: (215) 398-0434.

Turbo 64

Swisscomp has introduced **Turbo 64,** a 16-bit speed-up card for your Commodore 64. The card, which fits into the expansion port, increases the speed of the computer from 985 kilohertz to 4 megahertz.

Swisscomp says that **Turbo 64** can speed up programs and loading time as much as 400% to match the processing speed of an IBM PC. The unit has a 65816 microprocessor with 64K of RAM (battery-backed), which addresses up to 16 megabytes of memory.

In addition, **Turbo 64** emulates the 6510 chip in the 64 for 100% compatibility. And an EPROM is included on the board so users can add other operating systems if you have the equipment necessary to burn in the program.

The board retails for $189, including the 64K or RAM. It's available from Swisscomp Inc., 5312-56th Commerce Park, Tampa, FL 33610. Or call: (813) 628-0906.

Packet Radio

New from Kantronics is a booklet called **Introduction to Packet Radio.** For those unfamiliar with the concept, packet radio is the ability to transmit data from one computer to another by means of a radio transmitter/receiver instead of over conventional phone lines.

The book is written in a conversational style, and answers the most common packet radio questions like what it is, where it's used, the necessary equipment, how it works, and more. It is 19-pages long, with the last four pages devoted to listing various radio services available.

For more information contact Kantronics Inc., 1202 East 23rd Street, Lawrence, KS 66046. Or call: (913) 842-7745.

NEWS

Street Sports Baseball

For your Commodore 64 from Epyx comes a new slant on the game of baseball called **Street Sports Baseball**. Unlike traditional baseball games, this one takes place in the street of a local city neighborhood. With only 16 players to choose from for both teams, which is normal for pick-up games, some of your players will be handling more than one position.

But playing in the street is sometimes tougher than on a standard diamond. For instance, players have to dodge obsticles like tree stumps and bushes as they run from base to base. And the bases themselves can be anything from a trash can lid to a piece of cardboard.

Street Sports Baseball lets you choose player positions, batting order, the speed of each pitch, and the timing of each swing. The game is designed for either two-person play or you vs. the computer. The game features a split screen with both close-up and blimp-eye views of the field.

For more information, contact Epyx at 600 Galveston Drive, Redwood City, CA 94063. Or call: (415) 366-0606.

Stationfall

Three years after the introduction of Planetfall, Infocom has announced the release of its sequel—**Stationfall**. This stand-alone adventure game reunites you with the robot Floyd for a trip to a nearby space station. Of course the station is deserted except for an Ostrich, an Arcturian balloon creature and a brainy robot named Plato.

The price is $34.95 for the Commodore 64/128 version and $39.95 for the Amiga version. Game materials include assignment forms, blueprints for the space station and an official sew-on patch. A coupon in the box offers the original program Planetfall for $14.95.

For more information contact Infocom, Inc. 125 CambridgePark Drive, Cambridge, MA 02140. Or call (617)-492-6000.

The Wrath of Nikademus

Strategic Simulations is now marketing a game for Commodore 64 computers called **Phantasie III: The Wrath of Nikademus.** This is the conclusion to the Nikademus adventure series. In this final confrontation between a band of adventurers and the Dark Lord and his minions, the game features more detailed wound handling, more strategy and combat options, enhanced monster/character graphics, more magic spells and an increased play speed.

In addition, players who have built up characters in the other adventures of this series will be able to transfer and use them in this new senario. Adventurers come up against over 80 different monster types through a wide variety of dungeons. And you can make player movements via a joystick as well as the keyboard.

The Wrath of Nikademus comes complete with disk, rule book and data card, and it lists for $39.95. For more information, contact Strategic Simulations, 1046 N. Rengstorff Ave., Mountain View, CA 94043. Or call: (415) 964-1353.

Barbarian

A new game from Psygnosis for the Amiga is **Barbarian. Barbarian** is an animated fantasy adventure where you play Hegor, the famous dragon-slaying, monster-mashing Barbarian.

His mission, and yours should you decide to accept it, is to enter the underground world of Durgan, which the evil Necron uses as his base of operations. Then you must fight off dozens of grizzly monsters and avoid a variety of hidden traps until you eventually destroy Necrons lair and reclaim the crown of the local kingdom. It retails for $39.95.

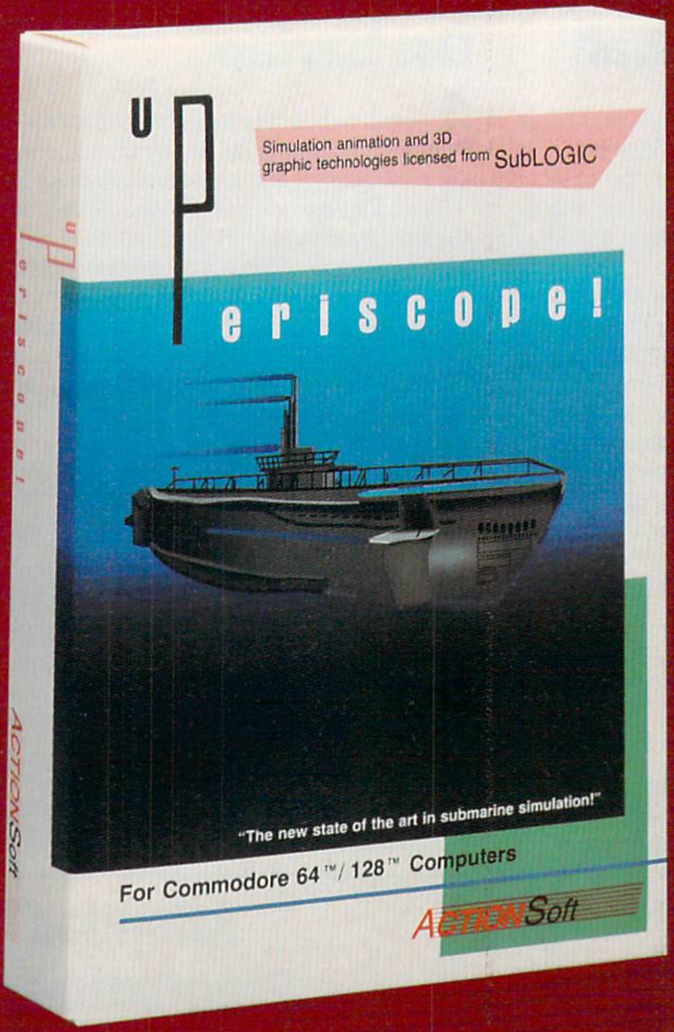
For more information, contact Psygnosis Limited, First Floor, Port of Liverpool Building, Liverpool L3 1BY, UK. Or call: 051-236-8818.

geoPublish

Berkeley Softworks has announced **geoPublish**, a desktop publishing package for the Commodore 64/128. Working within the GEOS operating system, **geoPublish** includes features such as: WYSIWYG multi-column formats, multiple fonts, styles and point sizes (up to 48 points), graphics that can be cropped, centered and scaled, full pages and zoom previews, and printing to dot matrix or LaserWriter printers.

For more information and pricing contact Berkeley Softworks, 2150 Shattuck Ave., Berkeley, CA 94704. Or call (415)-644-0883.

WE'VE BLOWN THE COMPETITI



Up Periscope!, the new state of the art in submarine simulation! Blowing the competition out of the water with superior combat strategy and tactics courtesy of Captain John Patten, USN (Ret.). With true animated 3D graphics courtesy of SubLOGIC. Up Periscope!, generations ahead of the pack!

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Fire 3	Number of Scenarios	6	3
Fire 4	Split-Screen Views	Yes	No
Fire 5	Reality Levels	11	7
Fire 6	Radar Screen	Yes	No
Fire 7	Accu-Sound™ realism	Yes	No
Fire 8	Torpedo Types	3	1
Fire 9	Auto or Manual Torpedo Launch	Yes	Yes
Fire 10	Time-Day-Month-Year Selection Capability	Yes	No
Fire 11	Zoom Feature	Map or Ship Views	Map View Only
Fire 12	Submarine Strategy & Tactics Manual by John Patten, Capt. USN (Ret.)	Yes	No
Fire 13	Auto-Load Feature on C128	Yes	No
Fire 14	Joystick Required	No	Yes

ON RIGHT OUT OF THE WATER!







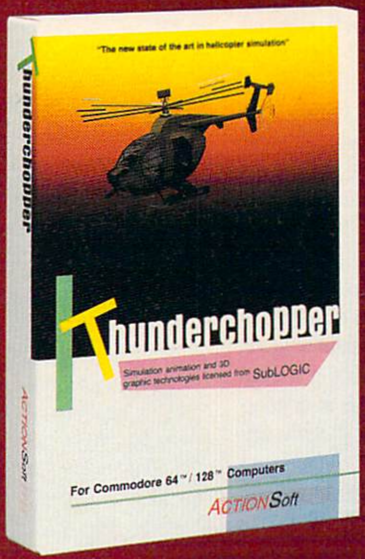






ThunderChopper

And don't forget ThunderChopper! For true helicopter action and realism, nothing else even comes close. ThunderChopper incorporates the most advanced graphics, flight systems, and game-playing factors to provide a sensational balance of strategy and fun.



See Your Dealer...

Or write or call for more information. Up Periscope! and ThunderChopper are available on disk for the Commodore 64/128, Apple II, and IBM PC line of personal computers for the suggested retail price of $29.95. For direct orders please specify which computer version you want. Include $2.00 for shipping (outside U.S. $6.25) and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club charges accepted.

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LOU SANDER'S

Tips & Tricks

Hints for Fun and Utility

COMPILED BY LOUIS F. SANDER

Since it's summertime for most of our readers, we've kept this month's labor to a minimum. Instead of presenting jewels to type in, we're offering 25 tips for getting the most from commercial software programs. From *Acrojet* to *Zaxxon*, there's something here for everyone. CAUTION—because so many commercial programs are involved, we have not been able to test all of these tips and tricks. They're presented as received from our contributors.

For those hardy readers for whom typing a few lines does not represent onerous physical labor, we've provided a few type-'em-yourself gems. The Spritemaster Snaders of Baltimore have contributed one of their usual pearls, and we know it will be worthwhile for you to type it in.

If you have an idea, tip or trick that you'd like to share with others around the world, write it up and send it in (only one tip per sheet of paper, please). We pay from $10 to $50 for each item we use. Send your tricks to:

Louis F. Sander
P. O. Box 101011
Pittsburgh, PA 15237

When you send in your tricks, let us know what you think about the column. If you include a self-addressed stamped envelope, we'll send you our Trick-Writer's Guide. International readers may omit the stamp.

Printer Paper Alignment: You can save time and wasted paper by noting and marking various alignment landmarks on your printer. The first step is to learn exactly where the printhead operates and how to line up your paper so the head will print in the desired place on the sheet. Print a line while watching the printhead carefully, observing the relationship between the paper, the printing and a convenient landmark on the printhead mechanism. Now put a pencil mark on the paper and try aligning it so the printing falls exactly on your mark. After a few tries, you should be very good at lining things up. So you won't forget, make a note and/or diagram and keep it somewhere handy. Sometimes the handiest place is on an adhesive label attached to the printer.

Adhesive labels are also useful for marking alignment locations for different sized paper. On my Commodore DPS-1101, there's a piece of masking tape with marks for aligning 8-1/2″ letterhead and 9-1/2" perforated paper. If I align the paper with the marks, I know that the left margin will always be in the same place when I use the printer for word processing. Since the left margin is always in the same place, so is the center of the printed line; consequently, everything I center is really centered, regardless of which paper I'm using.

I've also made an artificial landmark for the top edge of 11″ paper. When I align the paper with my landmark, I know that printing will always start the same distance below the top of the sheet. I've set my word processor's top margin and page lengths accordingly, so my top and bottom margins are always even and perfect.

Finally, I have marks on my printer for aligning mailing envelopes. Since envelopes are a different width and length than normal paper, it used to be hard to put the address exactly where I wanted it. But with my landmarks, it's a snap. For perfect placement of a three-line address, I put the envelope's top left corner at my special envelope landmark, set the left margin at 32, and print.

Most of my landmarks were located by trial and error, then permanently located by making a line on a self-adhesive label. Mechanical parts of the printer can serve as landmarks if they are stationary and properly located.

Louis F. Sander
Pittsburgh, Pennsylvania

64 Chopper Pilot: Here's a dynamite little game packed into just 18 lines of BASIC. It produces a full-sized animated helicopter, complete with sound, which can be controlled by a joystick plugged into port 2. Once you move the chopper in any direction, it keeps moving in that direction until you apply the appropriate amount of reverse thrust. If you run into the border, you are smashed to smithereens.

Did you ever see so much action packed into such a little program?

Bob & David Snader
Baltimore, Maryland

```
10 PRINT"[CLEAR,L. RED]
   C64 CHOPPER PILOT - BOB & DAVE
   SNADER":X=50:Y=237:S=54296:V=53248
20 POKE V+16,0:POKE V+21,1:POKE V+29,1
   :POKE V+33,1:POKE V+39,6
30 FOR T=832 TO 840:READ Q:POKE T,Q
   :NEXT:FOR T=896 TO 904:READ Q
   :POKE T,Q:NEXT
40 FOR T=841 TO 870:READ Q:POKE T,Q
   :POKE T+64,Q:NEXT
50 J=PEEK(56320):L=L+(J=126)*.2
   :L=L+(J=125)*-.2:M=M+(J=123)*.2
   :M=M+(J=119)*-.2
60 X=X+M:Y=Y+L:B=14+(B=14):POKE 2040,B
   :POKE S,15:POKE S,0
70 IF F=0 AND X>255 THEN POKE V+16,3
   :X=0:F=1
80 IF F=0 AND X<24 OR Y>238 OR Y<50
   THEN 120
90 IF F=1 AND X<0 THEN POKE V+16,0
   :X=255:F=0
100 IF F=1 AND X>40 OR Y>238 OR Y<50
    THEN 120
110 POKE V,X:POKE V+1,Y:GOTO 50
120 POKE 2040,1:FOR T=0 TO 3000:NEXT
    :RUN
131 DATA 000,000,000,000,007,000,000,
    002
132 DATA 000,007,224,000,000,031,192,
    000
133 DATA 002,063,224,006,000,144,031,
```

Continued on pg. 58

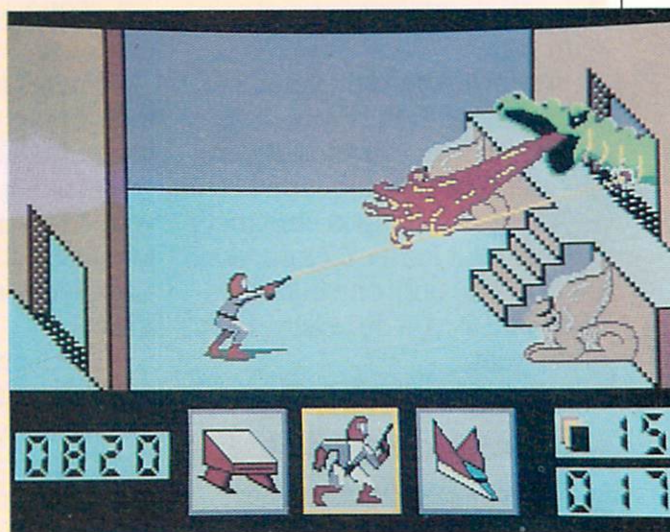
In every city of this country, someone is waiting to meet you.

REVIEWED BY BOB GUERRA

Deceptor

Computer: Commodore 64
Publisher: Avantage/Accolade
20833 Stevens Creek
Boulevard
Cupertino, CA 95014
Medium: Disk
Price: $14.95

Navigate your convertible land/air vehicle through five deadly corridors of a colorful three-dimensional world.



Have you ever been stuck in a massive traffic jam and wished that, just for once, your car could sprout wings and take you soaring high above the other cars? Well with *Deceptor*, one of the first releases from Accolade's Avantage line, your wish comes true as you navigate your convertible land/air vehicle through five deadly corridors of a colorful three-dimensional world. Instead of the usual type of traffic—sports cars, delivery vans and honking taxi cabs—these roads are packed with all sorts of bizarre creatures and dangerous obstacles designed to keep you from reaching your destination.

As you make your way along these strange routes, a press of the joystick button converts your land vehicle into a sleek aircraft allowing you to fly over many obstacles. As soon as you land, however, the craft returns to its original form. When your craft makes its transformations, you get to watch a close-up of the vehicle smoothly changing form. While this animation and the accompanying sound effects are impressive the first couple of times, after a while the change becomes an annoying interruption to the flow of the game. Fortunately, however, you can adjust the transformation speed from slow to very fast, and even turn it off altogether so the change occurs instantly.

Other options let you adjust the responsiveness, acceleration and deceleration of both your air and land vehicles individually. Even at maximum responsiveness, though, the air vehicle seems a bit sluggish at times. You can also adjust the sound filter and if you like, these settings can be saved to the program disk to become the new defaults, so each time you load the game they don't have to be readjusted.

You begin with only 30 seconds to travel through the first corridor, but you receive an additional 10 seconds for every ammunition unit you collect along the way. The corridors are presented in three-quarter perspective, much like the old Zaxxon arcade game. When you make it to the end of a corridor, your vehicle automatically transforms into a humanoid, and you can then use the ammunition you've collected to battle the gate keeper—a fire-breathing dragon. Blast him five times with your laser pistol and you advance to the next level.

Subsequently, corridors become increasingly difficult to navigate but, fortunately, you're also allowed more time (100 seconds) to complete them. Since you can only use your laser pistol against the gate keeper at the end of each corridor, you must figure out the best way to avoid the Replicoids, Ion Viper, Plasmadons and Flying Sadytes that patrol the maze-like corridors. Often the only way to pass certain obstacles is to fly over them, but once you take to the air, new threats appear. Sometimes the creatures you face are nothing more than floating geometric shapes—spheres, diamonds, rectangles—but others are more imaginative. Some of the more bizarre include bouncing eyeballs, dripping slime in assorted colors, and a chattering set of teeth that flies after your air vehicle using helicopter rotor blades for propulsion. Although you don't have a set number of game lives, contact with any of these will cause your craft to explode and cost you valuable time.

Now I did have just a couple of minor complaints. First, the gate keepers at the end of each corridor don't present much of a challenge. Even the evil and foreboding looking guardian at the end of the fourth corridor can be taken out with a few well placed shots from your laser pistol. Second, although the instruction booklet is written clearly, it's incomplete. Only by fooling around with the function keys while playing did I learn that F7 can be used to pause the game and that F3 toggles the sound on and off.

Nevertheless, I really enjoyed trying to make it through *Deceptor*'s five challenging levels. True, the game doesn't exercise your mind the way a match with *Chessmaster 2000* would, and once you've seen all of *Deceptor*'s strange inhabitants and learned how to make it through every corridor, the game will lose some of its appeal. However, for only $14.95, *Deceptor* is a challenging arcade game that gives you the chance to fulfill a wish and leave the ground behind you as you soar above your troubles. Unfortunately, once you get up there, you'll discover a whole set of new ones.

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THE AMIGA TECHNICAL REFERENCE SERIES from Addison-Wesley gives software developers and programmers the key to unlocking the power and versatility of the Amiga Personal Computer.

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REVIEWED BY JOHN JERMAINE

Portal

Computer: Commodore 64
Publisher: Activision
2350 Bayshore Parkway
Mountain View, CA 94043
Medum: Disk
Price: $39.95

Think of Portal *as the pages of a book ripped and tossed into the air. Your task is to reconstruct the book page by page.*



Early in 2004, you volunteered for a special mission that would take you to another solar system. But something went wrong. You were revived, expecting to begin a year of scientific tests and observations near the twin star system 61 Cygni. To your amazement, you discovered that your ship was bound toward earth.

In your absence, many new satellites had been added to the crowded sky above the planet, but these devices lacked their normal electronic chatter. A scan of the planet showed that not a single person remained. Several days ago, you landed your small craft south of the great metropolis of Chicago. Since your departure from the planet, the city had been preserved under an enormous transparent dome. As you approach the massive structure, you find the access lock of the dome open.
the building, you discover a chamber bathed in a mysterious glow. Upon closer inspection, the glow originates from the light of a computer terminal. Nearby you find a manual titled "WORLDNET Emergency Operating Instructions." It explains how to contact a special group of 12 data centers that have stored valuable information about the affairs of the world. Seated at the keyboard, you're ready to explore the years of the planet you never knew.

I spent 12 consecutive evenings studying *Portal*. After I finished evaluating the product, my curiosity led me to look at another reviewer's comments to see if we agreed on most of the major issues. Surprisingly, the reviewer thought *Portal* was a boring game.

First of all, the program isn't a game at all, and it doesn't resemble any game on the market. You don't take command of a great vessel loaded with weapons, for example, or assume the role of some colorful character setting off on a dangerous cosmic quest. No scoring mechanism is present, and you don't have to worry about penalties, timers, carrying the right objects around with you, or the threat of being blasted to atoms by a powerful foe that can appear at any moment. So what exactly is *Portal*? I believe it is a science fiction book merged with a classic mystery novel. You are the title character in a story where you forage for clues to solve a great mystery.

Two features are constantly displayed on the screen: a dataspace window that dominates 90% of the picture and a focus line at the bottom of the screen which contains four icons. The window has two functions. First, it displays a 12-symbol map of data bases you can explore just by manipulating a joystick. This window also acts as a monitor screen for the text files, diagrams and pictures you encounter along the way.

Once you've focused your attention on a single data space, like History for example, press the fire button and view the list of file titles it contains. Titles that have already been examined have a check mark beside them. After you have seen the list of titles, select a file to read, use the stick to maneuver that title into the data space window, and press the fire button one more time. The file is now open for inspection, and the window has transformed from a list of titles to pages of text. Pulling down on the joystick calls up the pages of the file in their proper order. Pushing the stick forward reviews the pages you have just read. The words "No more" appear at the top of the window whenever a file is finished.

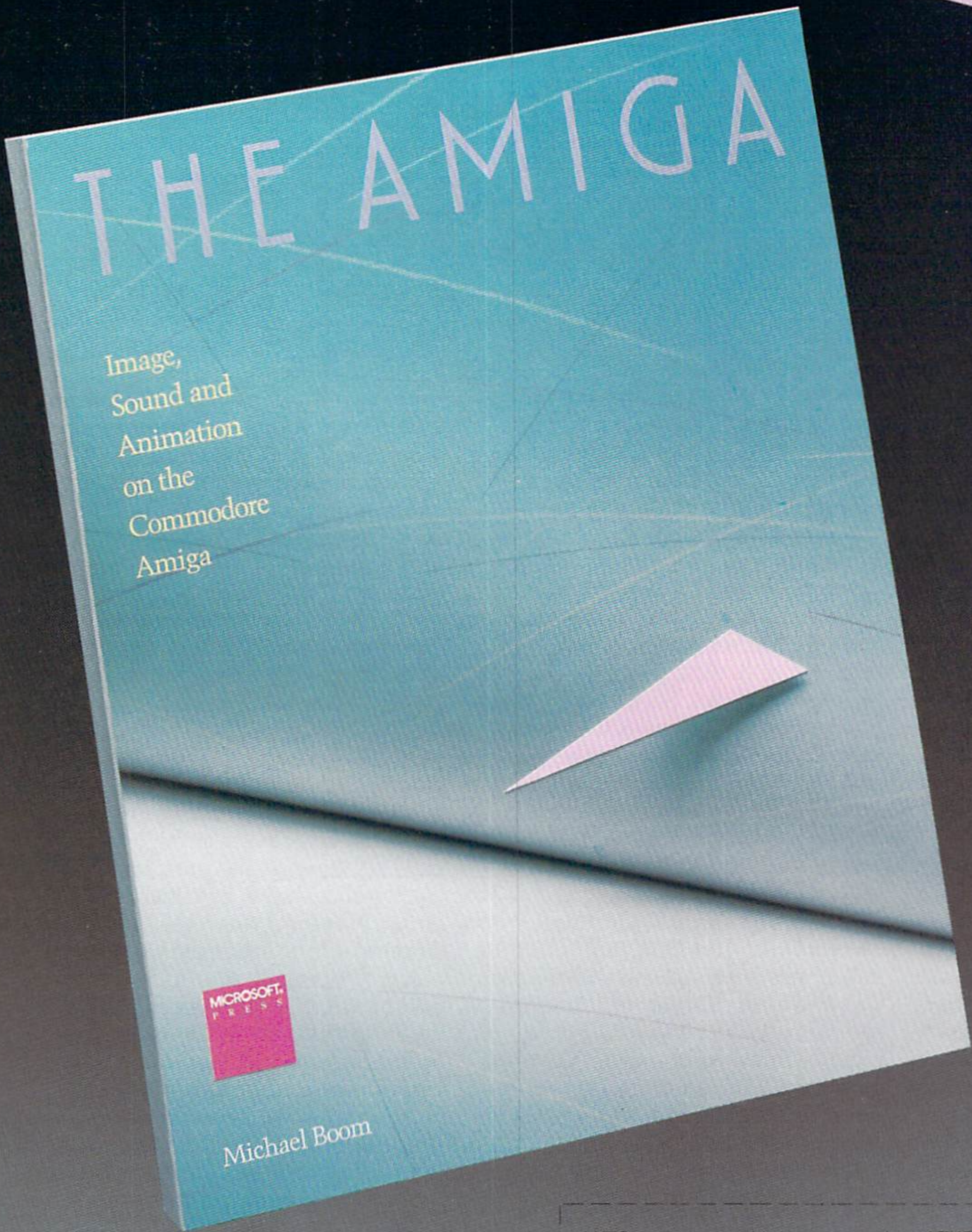
Portal's focus line is a master control panel containing the four icons. Going from left to right on the strip, the long blue rectangle allows the user to exit a file at any time, while providing a visual report of how deep you have penetrated that particular data space. The white block is used to mark your place in the program when you wish to quit right now and return to that point at another time. A yellow square displaying a black drawing of a man's face is a direct line to Homer, your computer ally in this search for the truth. You use this symbol quite often because Homer wants to solve this mystery as much as you do. He tries to tell you where to go for your next file of information and sometimes he makes this square flash to tell you he has a very important message. But most of the time Homer provides some food for thought that helps you reason where you should be looking for unopened data files. Activating the final gray box returns you to the interface map of data space icons.

Homer has the ability to extract data from unknown sources and convert it into an interesting narrative story. Central Processing, located in Geneva, is an unusual data space because it seems to acquire a lot of information that doesn't quite fit into one specific category.

Some data centers contribute graphics to the program for the viewer to examine. Psychology, for example, offers graphic psychological profiles of many of the characters in *Portal*, while Edmod displays each individual's aptitude and learning skills profiles in the same manner. Life Support provides another collection of graphics which allow you to

Continued on pg. 114

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REVIEWED BY GARY V. FIELDS

The Pawn

Computer: Commodore 64
Publisher: Rainbird Software/Firebird
P.O. Box 49
Ramsey, NJ 07446
Medium: Disk
Price: $44.95

The Pawn *is different from most interactive adventure games because it is fully illustrated.*



I should have known it was going to be one of those days. First I wake up in a forest (who knows where?) with a splitting headache and a mysterious metal band locked around my wrist. Half dazed, I wander around trying to make some sense of my predicament, and the next thing I know, I'm nose to nose with a wizard of some sort. Before I can organize my thoughts, the old geezer is pressing a sealed note into my hand and insisting I take it to the king.

Well, to make a long story short, I waste most of my lunch hour before finding the king's place. Now believe this if you can—I actually talked my way past the big guy's guards and put the note right in the king's hand! I figure, hey, I'm in for an invitation for tea with the royal family, minimum. But no! The guy gets all bent out of joint about something in the note and without even a thank you, pitches me out of his palace. Well, I understand kings have problems just like the rest of us and maybe he's had a bad day, but that's no reason to be unhospitable. So I pick myself up, dust off my backside, and start back in to pull this hotshot king down a royal notch or two. I figure at the least he owes me a tip. After all, I wasted my time trying to do him and the old wizard a favor.

Looking back I realize that move was a mistake. First the guards mess me up a bit for my foolishness. Then when I'm ready to show them they can't push me around, this big guy with even a bigger axe starts making like Paul Bunyan and mistakes me for a pine tree. In a split second I'm two feet shorter than I should be and can't wear shoes. The next thing I know, I wake up back in the forest with knee knobs for toes.

This little adventure took place while I was exploring the world of Kerovnia in the adventure game named *The Pawn*. The game creates a magical land called Kerovnia which is inhabited by dwarfs, unicorns, princesses, dragons, witches and you. It is a world with enough wonders, treasures and laughs to entertain even the most critical adventurer. And unlike many text adventures which insist upon a serious, sometimes gruesome approach to their subject matter, *The Pawn* mixes some light, humorous moments with the adventure as well.

The Pawn is different from most interactive adventure games because it is fully illustrated. Each important page of the story is enhanced with an artistic multicolored screen display. So you not only read the story, but you see it as well. Some dyed-in-the-wool text adventurers may argue that the inclusion of illustrations in the traditional text adventure is heracy. For those folks, Rainbird has included an option to play the game strictly as a text game. But in my opinion, playing the game with the graphics switched off would make as much sense as listening to the Super Bowl on radio when a big screen TV was available.

With or without graphics, *The Pawn* will satisfy any serious adventurer's palate because the adventure is well written, challenging and entertaining. Like any good novel, it is a vehicle which can transport you far from the cares of 1987 to the wonders of another land and another time.

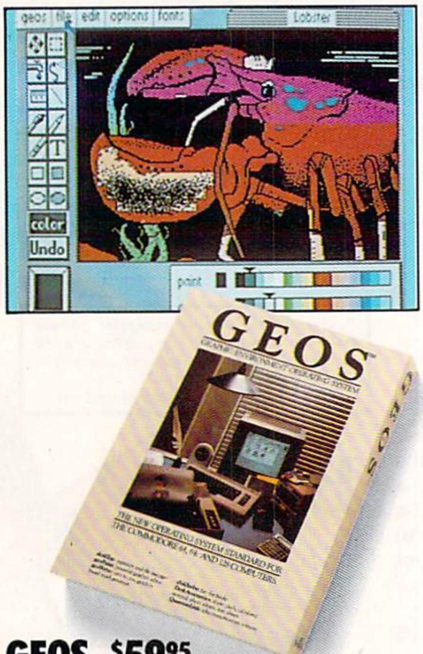
The illustrations in some cases offer clues to the game's completion. The function keys let you toggle between a large display covering most of the screen, a small cameo size display which covers only about 1/20th of the screen, or no graphics display at all. If the large screen is displayed, you can also adjust its size by raising or lowering it one line at a time.

Like any good text adventure, the games parser is excellent and will accept cryptic one letter commands (n = go north) as well as complete sentences (get the old rusty key, the gold key, and the large padlock key). If you wish, you can even string several sentences together as a single input and the game will digest those huge mouthfuls and respond just as sensibly.

But the feature most veteran adventures will appreciate is the input screen editor, which allows you to edit your input before submitting it to the program. Unlike most other text games which require you backspace to edit a line of text, *The Pawn* allows you to edit input as you would with a word processor. You are free to cursor over letters, insert information, or duplicate input with a single key. There is nothing worse than getting deeply involved in an adventure and then have your concentration broken by

Continued on pg. 116

IF YOU STILL THINK CO
PLAY AROUND



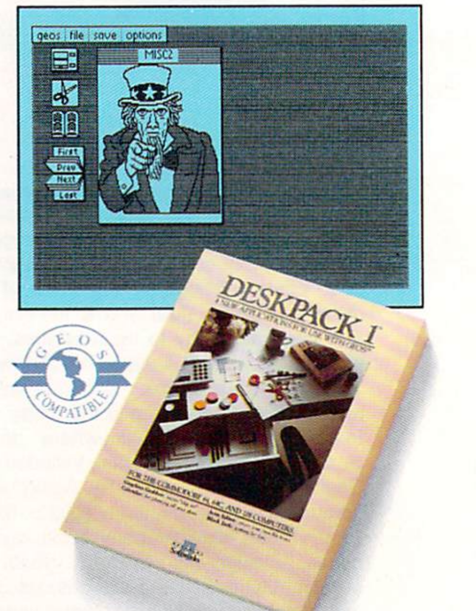
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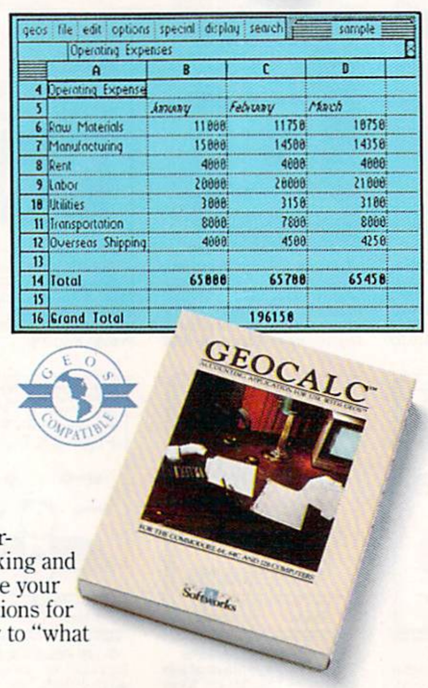
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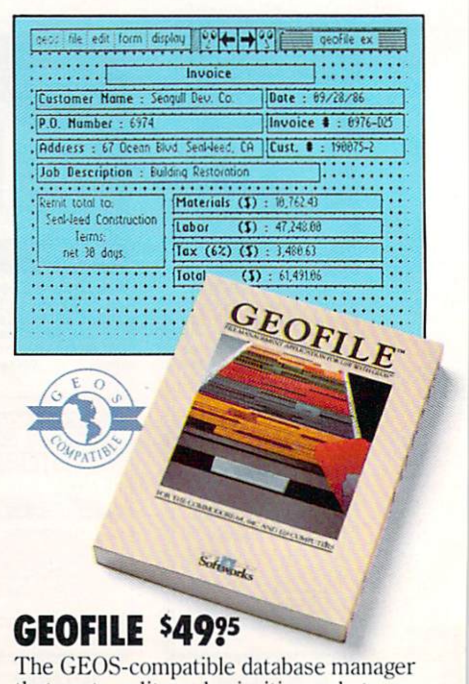
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6	Raw Materials	11000	11750	10750
7	Manufacturing	15000	14500	14350
8	Rent	4000	4000	4000
9	Labor	20000	20000	21000
10	Utilities	3000	3150	3100
11	Transportation	8000	7800	8000
12	Overseas Shipping	4000	4500	4250
13				
14	Total	65000	65700	65450
15				
16	Grand Total		196150	

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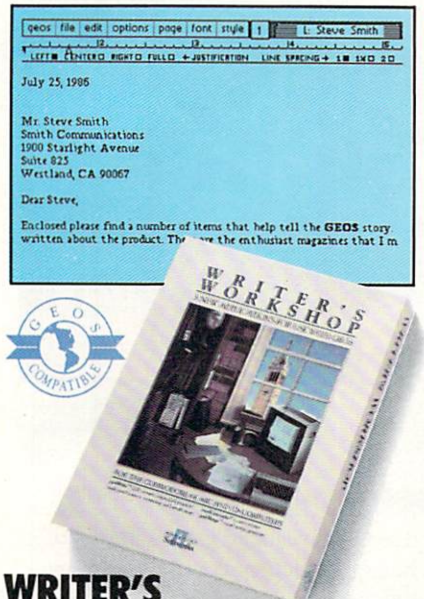
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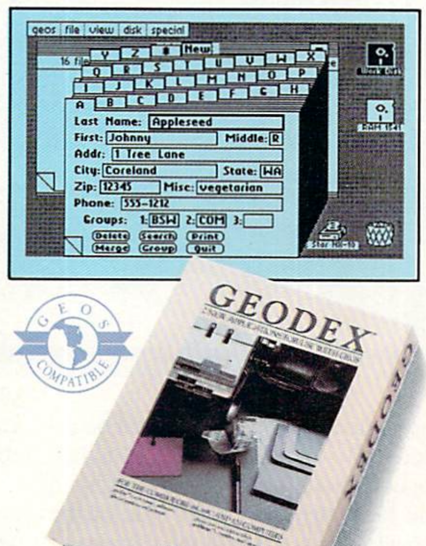


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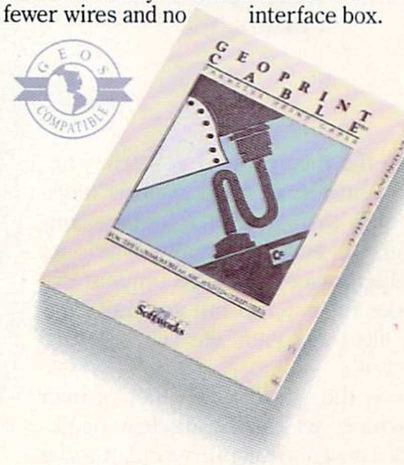
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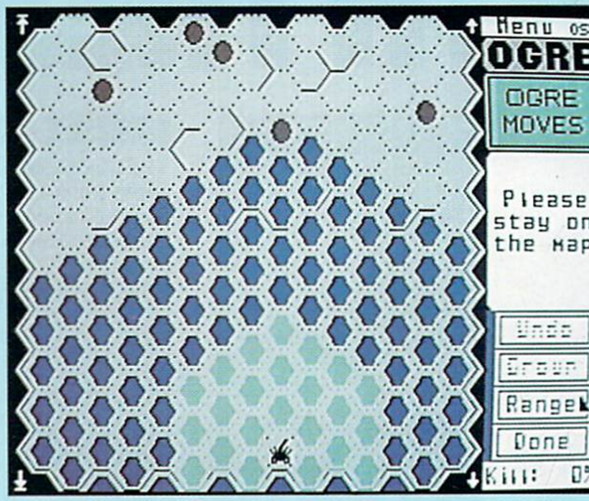
The brightest minds are working at Berkeley.

REVIEWED BY SCOTT A. MAY

Ogre

Computer: Commodore 64
Publisher: Origin Systems/Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Medium: Disk
Price: $40.00

Using a wide variety of armored and infantry units, you must defend a command post against an almost perfect killing machine.



Of all the themes used in science fiction and horror, perhaps none is more frightening than that of relentless, uncontrollable evil—especially when its incredible power is focused on your destruction. You can run, but you must ultimately fight for your life. There is no other choice.

Ogre is the visionary conflict of man vs. machine, set on the nuclear battlefields of a post-apocalyptic world. It is the computerized version of Steve Jackson's classic board game, which in turn was based on Keith Laumer's science fiction stories of the *Bolo* fighting machines. The result is a brilliant creation of simplistic design and boundless strategic depth.

Accomodating either one- or two-player games, *Ogre* is easy to learn and effortless to play. The basic structure of the game is deceptively simple: Using a wide variety of armored and infantry units, one player must defend a command post against a single enemy fighter. Unfortunately, this lone enemy unit is a cybernetic supertank known as an Ogre. A product of advanced artificial intelligence and equipped with a massive nuclear arsenal, the Ogre is almost a perfect killing machine. Think fast and strike hard, because you have been targeted for termination.

Ogre is a fascinating study of survival and aggression. It is actually two games in one, giving players the opportunity to assume the role of the hunter and the hunted. In solitaire mode, the computer-controlled Ogre is a cunning and ruthless attacker. Two-player mode challenges you and a friend in a fierce battle of wits. Each side must develop its own unique strategy to win. Switch perspectives for a greater understanding of your enemy's logic.

The game is played on a vertical board divided into a hexagonal grid. Only half of the battlefield is visible on the screen at one time. Arrows on the side of the screen allow you to scroll the map up or down. The majority of the battlefield is littered with craters and rubble from past nuclear explosions called the Obstructed Area. These obstructions limit travel, effectively creating an extra element of strategy during the game.

Player input is implemented directly from the keyboard or by joystick. The joystick method is time-consuming, but still the best choice for two-player games. Commands and play options are entered by either pointing and clicking or dragging an arrow-shaped cursor through pull-down windows. Play options allow you to load, save or edit battlefields (five predesigned fields are included in the game) and load/save games in progress.

The Field Editor allows you to create unique field conditions or modify existing ones, including craters, rubble and defensive forces. Experienced players may wish to clear the entire field and start from scratch. Certain restrictions must be followed, however, to comply with official Ogre rules. These restrictions apply to the placement and total number of craters and defensive units. Error messages indicate the offending conditions, which can be corrected or played as is. Unbalanced games automatically nullify all victory conditions set by the program.

Defensive units include heavy tanks, missile tanks, howitzers, Ground Effect Vehicles (GEV's), and infantry squadrons. Each piece is rated in four categories: attack strength, attack range, defensive strength, and movement. The importance placed on each defensive unit is relative to the player's overall strategy.

Howitzers pack the biggest punch from the greatest distance, but are stationary and completely defenseless. Heavy tanks can move fast and strike hard, but have very limited range. Missile tanks forfeit movement and firepower for greater attack range. GEV's are rated low in attack strength and range, but are allowed two movements per turn, making them perfect hit-and-run fighters. Infantry pieces may be grouped together in squadrons of up to three units. Mostly ineffectual, infantry units usually bring up the rear as a last-ditch defensive measure.

The final—and most important—defensive unit is the Command Post. Placed at the top of the battlefield, the Command Post cannot move, attack or defend itself. The Ogre's main objective is to destroy the Command Post and, if possible, every defensive unit on the board. On defense, you must preserve the Command Post and either destory the Ogre or force it off the bottom of the map.

Three victory conditions—complete, partial or marginal—are available to each side at the end of the game.

The Ogre itself enters the game from the bottom of the map. It is available in two models, the Mark III and Mark IV. The major difference between the two models is the quantity of their weapons, which include missiles, main and secondary batteries, antipersonnel guns and massive treads. Like its defensive counterparts, the Ogre's weapons are rated for both strength and range. In addition, three skill levels may be set for the Ogre in single-player games.

Offensive strikes by the Ogre may either hit, miss or disable a defensive unit. A decisive hit explodes the target, with appropriate sound effects, removing it from the board. Combat results are instantly calculated by the computer according to the weapon used, defensive strength, and target range. Combat odds, represented in a board game by rolling dice, are also simulated by the computer.

Defensive strikes against the Ogre may be directed at any of its weapon systems. Each hit reduces the quantity of that weapon until it is eventually eliminated. The best tactic is to concentrate on the Ogre's treads in an attempt to reduce its movement. Even without weapons, the Ogre will continue to move toward the Command Post, ramming and crushing anything in its path.

Perhaps the only thing more enjoyable than playing *Ogre* is the challenge of developing winning strategies. Defensive players must learn effective deployment. Howitzers, for example, should be placed so their target radius overlaps, forming a powerful shield in front of the Command Post. To protect the valuable howitzers, defensive players must also learn the fine art of sacrifice. Position several infantry squads at the edge of the howitzers' range. This will keep the Ogre preoccupied while you pound it from a distance.

Despite its enormous power, the Ogre must also utilize subtle strategies. Impassible terrain can be used to block a defender's pursuit. When evaluating multiple targets, concentrate on the defender that can do the most damage if left unchecked.

Ogre is a game of style and substance that grows deeper with continued play. Beneath its board game veneer is pure electricity. ■

REVIEWED BY ROBERT J. SODARO

Zoids

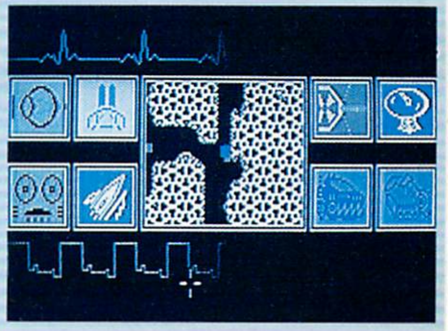
Computer: Commodore 64
Publisher: Activision
2350 Bayshore Parkway
Mountain View, CA 94043
Medium: Disk
Price: $14.95

In 1984, Activision brought out their first licensed game, *Ghostbusters*. Apparently the success of that product swayed them to jump into the licensing market with both feet, as this year has seen a host of licensed games headed our way, including the unusual *Zoids*.

If you've never heard of *Zoids*, you're not alone. These snap-together plastic robot models (now called Robo-Strux™ and distributed in the U.S. by Tomy) have yet to tap into the Transformers™ craze that swept the country. But fret not, Activision didn't latch onto a clunker here, as *Zoids* are big—not only in their native Japan, but in England as well, where they also co-starred in a Marvel comic book.

You are an earthman who has landed on Zoidstar where for the past millennium a terrible war has raged between two android factions that have been left over from an ancient race. You are forced to side with the Blue Zoid faction (against the more vicious Reds) to defeat their champion, Redhorn the Terrible. Unfortunately, the Blue's champion, Zoidzilla, has been dissected into eight pieces and scattered across the landscape. Your mission is to find the various pieces of Zoidzilla, reassemble him, and put an end to the threat of Redhorn.

Yeah, the plot is thin and the story is contrived (the comic was pretty weak also), but don't let that turn you off to an otherwise enjoyable game. As a computer game, *Zoids* has more things going on than most. You control a Zoid tank and via your joystick and a number of different icons, you have access to enough military supplies to choke several South American governments. You've got missiles, mines, a rail gun and jamming devices. You've even got sensors and shields. As a matter of fact, the only thing missing from your arsenal is the proverbial kitchen sink.



Your mission is to find the various pieces of Zoidzilla, reassemble him, and put an end to the threat of Redhorn.

With all this hardware you must wade through the alien landscape (which is a maze of valleys, gullies and cul-de-sacs) to engage your foes. When you approach each city, you must attempt to determine its broadcast frequency, match and jam it with your own shortwave, defeat any Red Zoids, nuke the city into submission, and locate the hidden sections of Zoidzilla. Once Zoidzilla has been assembled, you then must face off against Redhorn.

Graphics on this one are a tad unusual. First of all, not all of the monitor is used, and most of the action is viewed through a series of windows, all of which display illustrations of what is happening. However, when in the traveling and attack modes, the viewscreen window displays your Zoid, attackers and enemy cities as blue squares, red dots and yellow triangles respectively. Having actually seen the toy models, this reviewer was hoping to see Spiderzoids clambering across the landscape or Trooperzoids plowing through city streets. No such luck, as you simply spot and identify your target, and then start blasting.

In spite of this single drawback, *Zoids* proved to be an engaging product. The battle action should be enough to satiate the blood-thirstiest of the nuke-'em-'til-they-glow crowd, while appeasing strategists. While not the best translation that has ever crossed over the licensing fence, *Zoids* is certainly entertaining game fare, and a must for Zoid fans. ■

REVIEWED BY MARK COTONE

Millionaire: The Stock Market Simulation



Computer: Commodore 64
Publisher: Blue Chip Software
6740 Eton Avenue
Canoga Park, CA 91303
Medium: Disk
Price: $29.95

For some people, the stock market represents the ultimate in high finance excitement—a gripping maelstrom of big business opportunities where calculated gambles forever change lives with eye-popping profits and shattering losses. For others, this same market remains foreign. Having never had the inclination nor the need to investigate past the cryptic three-initial codes, these folks remain ignorant of the stock market's true value. For both of these groups, and for anyone who might fall somewhere in between, I would like to call attention to *Millionaire*, a first-rate stock market simulation.

This is an investment game to be enjoyed by all. Its uncannily realistic atmosphere will capture the attention of even the busiest of speculators, and its educational documentation, easy to understand design, and player-regulated pace will draw in all the uninformed and unfamiliar outsiders. *Millionaire* not only makes sense out of stock market dollars, but it also makes it entertaining.

The overall object of this challenge is to earn a million dollars as quickly as possible by making stock investments.

Starting out with a stipend of $10,000 in cash, each player tries to build his fortune by using researched knowledge and personal intuition to buy and sell stocks at the most profitable market moment. Simple, right? No chance. Prepare to lose your shirt.

The game's time frame covers a span of 91 weeks. At the beginning of the play session, you pick up the action after 13 weeks have already passed. In this way, users are presented with a short track record of all the market's issues. The Millionaire exchange consists of 15 companies divided evenly into 5 industry groups: retail, oil and gas, computers, heavy industry and automotive. It's only a small sampling of the plethora of companies that would be posted at the actual stock market, but the choices do represent some of the more recognizable and influential issues around.

To give the contest some structure, players are only allowed to call their broker once a week, dividing the game into 78 rounds.

With each new round the stock prices change, affording investors the opportunity to pursue that simple profit-making plan of buying low and selling high. As in the real world, the secret of success for the *Millionaire* speculator is the ability to anticipate correctly.

The movement of market prices is not a randomized affair. Many factors shape the climate of the stock exchange, and Blue Chip has accurately recreated this tumultuous environment by including a host of internal and external catalytic market elements. These factors are chronicled for inspection in a weekly Financial Journal report, a screen which gives a summarized rundown of all the influential happenings in the business world. These news stories are the pulse of market action, and investors should study them very carefully.

For directly or indirectly, all *Millionaire*'s price fluctuations can be traced back to this source. Perhaps the auto industry is anticipating a strike, or maybe a certain national company has made some major acquisitions. The weather might even come into play, with storms closing plants and deferring shoppers.

The player must take these current event items and analyze them against market trends, all of which can be researched by accessing a variety of realistic information channels. Graphs covering the action of each individual stock, the five industry groups, and the overall market can all be studied for tendencies and tips. A full scale price change listing, styled after the one found in the business section of every daily newspaper, is available for scrutiny.

You can even request a complete corporate history of each company, checking on revenues, sales, holdings, strengths and weaknesses.

With information channels like these, it's safe to say that a player will never be uninformed.

After all the research is complete, it's time to get down to business and make a few market transactions. Now, even if you've never so much as glanced at a financial page, have no fear. The *Millionaire* user's manual will take you on a painless guided stock market tour that will have you thickening your portfolio in no time.

All of the laws, rules and logic of the market are covered with documentation that is non-technical, clear and concise. You'll be amazed at how simple it is to grasp the basic stock market principles. And to further facilitate the learning process, Blue Chip initially limits the type of available investment opportunities, basing their restrictions on each player's current net worth.

For example, with your initial monetary allotment you are classified as a Novice, and may only purchase stocks. If you fare well and earn another $2,000, you will then be promoted up to Investor status, enabling you to now pick up margin stocks (stock acquisitions bought on broker extended credit). From here you will hopefully rise through the levels of Speculator, Professional, Broker, and finally, Millionaire. This experience-based tiered structure works well. By exposing the newcomer one step at a time, it insures that he will at least have some understanding of the simpler investment opportunities before trying to tackle a more complex transaction.

Provided that you can last long

Continued on pg. 115

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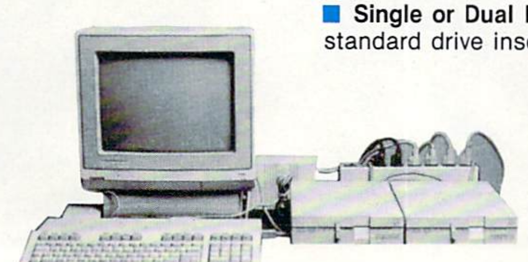
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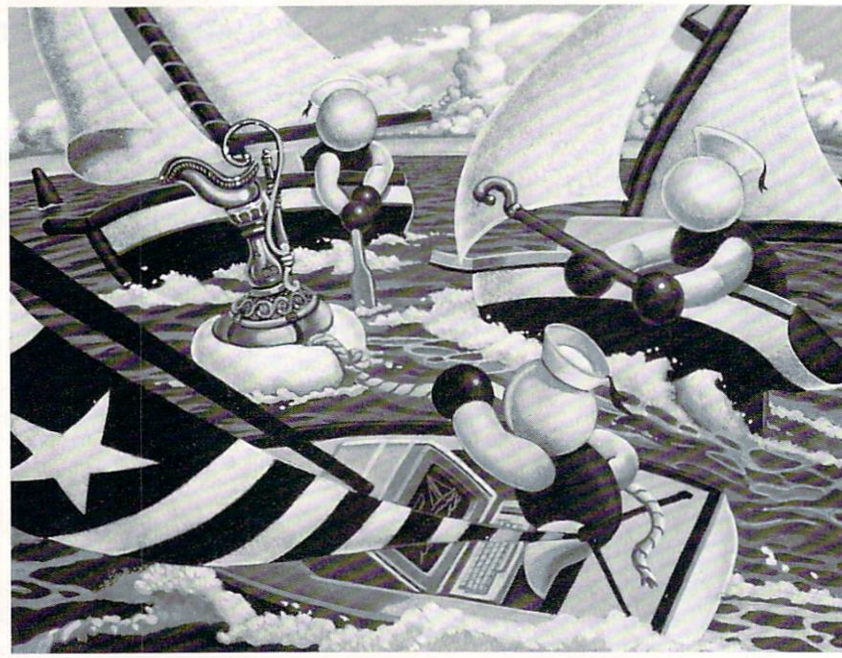
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REVIEWED BY MARK COTONE

The Official America's Cup Sailing Simulation



ED SAUK

Computer: Commodore 64
Publisher: Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Medium: Disk
Price: $29.99

With the superior sailing skills of the *Stars and Stripes'* crew bringing a quick close to this year's here-today-gone-to-morrow America's Cup spectacle, most 12-meter racing enthusiasts are now faced with the reality of a long three-year interim before the next scheduled yachting duel. But for those fans outfitted with Electronic Arts' newly released *The Official America's Cup Sailing Simulation*, there's no need to wait another minute. The crowd is in place, the boats are prepped, and the starter's cannon is ready to blow. Get all hands on deck, for the regatta is about to begin.

To stage their rendition of the world's premier sailing competition, Electronic Arts returns to Fremantle, Australia, the site of this year's grudge match finals between Conner and the *Kookaburra III*. Here, players are given the chance to sail away on a video representation of the now famous 24.3 mile track set off the coast of Perth, with buoy placement, leg lengths and weather conditions all reproduced with painstaking detail. As in the real life America's Cup challenge, this game is structured as a head-to-head showdown between two similarly equipped 12-meter yachts. It's you against human opponent or computer in the ultimate drama on the high seas. The first boat to cross the finish line wins the race, with the first crew to win four races receiving the coveted Cup trophy.

Your racing vessel comes fully furnished with all the sails, supplies and crew members needed to navigate the Perth course. Aside from an all-purpose mainsail, six different headsails have been stowed on board to help you skipper your yacht through tricky winds of every strength and direction. These include a trio of rigid genoa sails, each a different thickness and weight, to help propel the boat against a head wind, and the equivalent compliment of spinnakers, those billowing sails used to harness a tail wind.

A three-quarter perspective is used to follow the action, the optimum point of view for both skipper and spectator. From this vantage up above the racing ships, one can note relative yacht positions and sea conditions while still keeping watch to insure that all sails are properly trimmed and winched. In the event that one of the yachts opens up a large lead over his opponent, a split-screen display is utilized to allow each captain to keep tabs on his vessel's activities. Throughout the race, both players have access to their own Indicator Panel; a dashboard style square that sits at each corner of the screen's lower edge. The variety of instruments housed in this area are used by the captains to monitor all vital racing information, including the progress of the run, the current weather conditions, and boat speed, position and direction.

As many of us who followed this year's Cup race can attest, the piloting of one of these 12-meter wonders requires a balanced mixture of brains and brawn. To Electronic Arts' credit, they've made sure to include both.

On the cerebral end, there's a constant flow of tactical choices and strategic decisions to be made at a moments notice; all of which are apt to be assessed and reassessed as conditions change and game plans shift. To keep the skippers honest, this Cup recreation is run under the International Yacht Racing Union Blue Book rules, a comprehensive list of regulations that deals with such pertinent contest issues as right of way, proper buoy clearance, and premature starts. If any of these precepts are violated, an unseen committee acts as judge and jury, a decision is made, and a scrolling on-screen message notes the infraction and imposes the prescribed penalty.

In addition to these enforced guidelines, the ever changing sea conditions also test the captain's ability to think on his feet. Varying wind speeds, oscillating direction changes, gusts and lulls must all be taken into consideration when pondering such decisions as sail selection, mainsail trimming, and winch timing. With a few seconds usually separating first place from last, every piloting choice becomes an important one.

Putting the captain's orders into motion is the responsibility of the crew. In this game, your joystick acts as the hub of the action, initiating every phase of vessel operations to keep your yacht skimming

It's a sight to be seen: two players locked in a dead beat, each working furiously to gain an edge by reeling his stick a little quicker.

along without incident. Swinging the mainsail, steering the ship, pulling out a new headsail, and winching it up or down are all crew functions carried out with various manipulations of your controller. As a matter of fact, this last task, which would have real life crew members furiously cranking on their winches to hoist or lower a sail, actually requires the computer player to perform the same clockwise and counterclockwise cranking on his joystick. It's a sight to be seen: two players locked in a dead heat, each working furiously to gain an edge by reeling his stick a little quicker. It's a great touch.

This package touts itself as a simulation, and it wears its title well. The designing team behind the contest, a group that calls itself Micro Forte, has obviously done all of its homework, for it presents a race that is accurate on every physical, mechanical, and visual level. The Perth course is mapped, outlined and duplicated right down to the probable Western Australian wind shifts.

All the properties and tendencies of the 12-meter ship have been studied in such detail that the vessel will not only react accordingly when a correct piloting decision is made, but will also buckle under the pressure of an inaccurate call. Carry the wrong sail in strong winds and you will run the risk of snapping restraint ropes and bursting sails. Try to drop your spinnaker a little early or a beat late and it will fold and collapse into the water. And if you catch your mates off guard with a hastened request, like a rushed spinnaker maneuver, you might even send one of your crew members flying overboard.

All of these thrills and spills are accurately captured with crisp graphics. Strong winds whip up the water, sending whitecaps crashing past your vessel. Spinnakers hoisted correctly unfurl and snap open with authority. The finish line is even patrolled by a Committee Boat that signals your completion with a festive blast from the ship's cannon.

This is a challenge that is sure to please every member of the gaming crew. If you're an old salt, you'll feel right at home with your new Electronic Arts' yacht; it has all the features of the real thing. And even if you're the type whose sailing experience goes no further than a pool's inner tube, this game's varied difficulty levels, extensive documentation, and highly playable design will undoubtedly have you blanketing, pinching and tacking with the best of them. Remarkably easy to play and incredibly hard to master, *The Official America's Cup Sailing Simulation* is sure to keep you anchored to your computer for hours. ▣

Smooth Sailing
Turning the Tide in Your Favor

Electronic Arts, the king of documentation, once again lives up to its reputation with *The Official America's Cup Sailing Simulation.* This package's user manual—a solid 55-page instructional course that covers anything and everything from bow to stern—will patiently outline all the basics in simple layman's terms. From there you can graduate to a hands-on education around the Perth course, where persistency and practice will soon have you winching like a winner. Although successful racing will only come after you've spent time nailing down the sailing fundamentals, I've also listed a few extra pointers that might help you stack the slippery deck to your advantage. G'day and good luck.

When operating in this contest's winching mode, the tendency for most players is to try to speed up the grinding action by rotating the joystick at some bionic speed. This type of action will raise more sores than sails. The important part of computerized winching is to make certain that the stick makes correct contact with all four of the controller's sides during its circular motion. Be deliberate with this rotating action or you will only slow down your sail swap.

The most critical points along the Cup course are at the buoy turns, where yachts must attempt to change their sails and direction with speed and precision. Unfortunately, the two important operations—steering and winching—can't be performed simultaneously, since both are controlled by a single joystick. So the turn must be completed in stages. I've found the following formula to provide me with the most control and accuracy during this important maneuver.

Helmsman: Complete a half turn around buoy. Winching: Drop headsail until you hear the beep. Set Sail: Adjust mainsail in or out. Helmsman: Complete turn. Winching: Hoist headsail.

When tacking into the wind, you will probably notice certain patterns forming along your computerized opponent's sailing route. By watching his zigzagging motion carefully, you will soon be able to predict his moves right down to the very second. If you are involved in a tight match, it is possible for you to position your yacht so that the computer will commit a right of way foul as outlined in the Blue Book rules. He will then be stopped and penalized while you sail ahead unscathed. Dirty pool? Perhaps, but the least it will get you is a four-length lead.

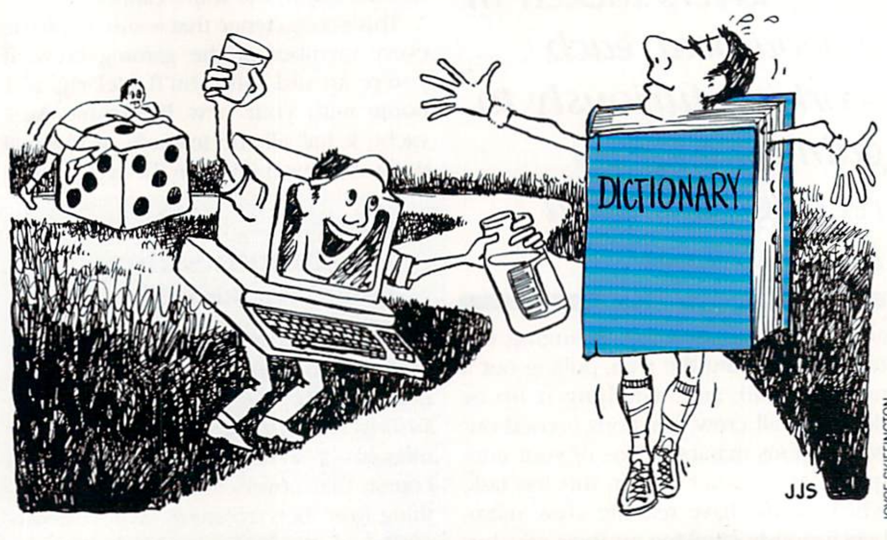
Since we're digging into our bag of dirty deeds, let me leave you with this underhanded trick. Whenever a ship passes over the square screen area containing a player's Indicator Panel, the program will momentarily remove the panel to provide an unobstructed view of the racing vessel. This disappearing act is usually of little or no consequence, with the affected player simply steering his yacht by sight until his instruments return. But there is one situation where this element can cause navigational havoc on your opponent.

Whenever the players are rounding a buoy, the game screen zeros in on that critical area to make sure no penalties occur. Even if the yachts are separated by a large enough gap that they will be approaching the turn one at a time, the buoy area will still be granted full-screen coverage, leaving the unseen boat to rely on instruments alone. Ah-ha—the trap is set. If you dip low around the turn and stall in your competitor's square, you will eliminate his only source of information and he will have no way of knowing his ship's position or actions. By the time you move on, he could conceivably be blown miles off course. The only problem with this sneaky strategy is that the tables are sure to be turned before the race concludes, leaving you to the whims of the wind. ▣

REVIEWED BY GARY V. FIELDS

Crosscheck

Computer: Commodore 64
Publisher: Datasoft
19808 Nordhoff Place
Chatsworth, CA 91311
Medium: Disk
Price: $29.95



The object of *Crosscheck* is to build a continuous word chain from the center of the playing field to your base before your opponent reaches their base or before time runs out. The bridge is constructed with words you deduce from short crossword puzzle-like clues. To make it more difficult, your opponent can, if the correct die is cast, block your path with other words or solid blocks.

The game combines the better qualities of several proven games like dominos, chinese checkers and crossword puzzles. But best of all, like a good board game, *Crosscheck*'s rules are both few and easy to understand. So getting started is simple, but mastering the game is a different matter altogether. To win requires patience, strategy and knowledge, plus a little luck since the correct roll of the on-screen die is important.

I was particularly pleased with how few rules govern play. Unlike many games which require the user to read and commit to memory a volume of do's and don'ts, *Crosscheck*'s instructions fit neatly on a single sheet of paper. But don't interpret this brevity to mean *Crosscheck* is an easy game to win—unless you are a walking dictionary.

Crosscheck's game board resembles a huge (several screens large) empty crossword puzzle. In the center of the board is a square with four colored starting points; the corners of the box are the different home bases. The object of the game is to build an unbroken chain of words connecting your starting point with your home base. But while trying to get across the board to your home base (similar to chinese checkers), you must prevent your opponent from getting to theirs. Sometimes it is wiser to ignore your opponent and concentrate on your chain of words. Other times you are wiser to waste a turn blocking your opponent's path. But be careful—what you intend as a stumbling block could be used by your opponent as a building block or later may block your own chain.

Words in the chain can cross, but only where letters that intersect match (similar to domino blocks). For instance, if your word was buttermilk and the word run was in your path, you could cross the word if you could position the r or u in buttermilk over the same letter in run.

Luck comes into play when the screen die is tossed before each turn. The die determines the length of words you must play—three to ten characters. If a one comes up, the player can place a block on the playing field, while a two allows the player to position a single letter of their choice. Because the die always turns in the same cycle, a skillful player can often get it to return the number they need. Learning to control the die toss (you simply press the spacebar at the right time) is very important since as the board fills, only words of certain size will fit. So while nine-letter words are great to get across the board in a hurry, you'll need some short words to finish.

After the die returns a number, a short clue (like those cryptic crossword clues in Sunday's newspaper) will appear. To add to your bridge, you must input the correct word which matches the clue. For instance, the answer to the clue for a six-letter word might be "slower than a gallop." The correct response would be canter. After you have satisfied the clue, you can rotate the word in any direction and place it on the playing board. Either a joystick or the keyboard can be used. While I found the joystick ideal for positioning words, because the clue must be answered from the keyboard I quickly adopted that device. After a few matches, the keyboard controls became almost second nature.

The game's screen display is a well designed game board which is easy to read and handle. The screen only shows a portion of the playing field, but all the areas can be examined by scrolling via the controls keys or the joystick. A sensible option which makes keeping track of both your own chain and your opponent's (one to four people can compete on the same puzzle) is Overview. When it is selected, the entire board is displayed as a high-resolution graphic so you can spot gaps in your chain as well as your opponent's. This option is invaluable near the end of the game when you think you have finished the chain but aren't declared the winner. By examining the overall view, you can spot the gap and fill it next turn.

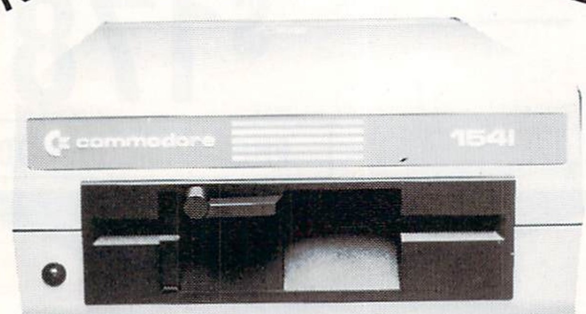
On the other side of the coin, you can use the information to place stumbling blocks in your opponent's path as well. Some of the blocks contain diamonds which help the player who uses them in two ways. First, they are more valuable

Continued on pg. 116

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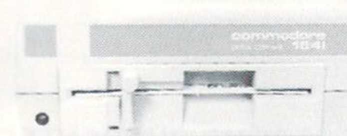
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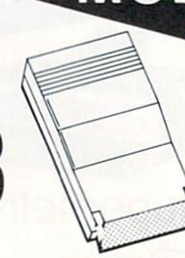
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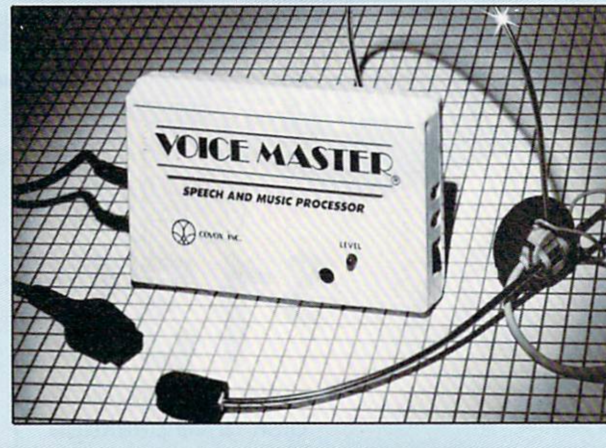

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REVIEWED BY KENT PATTERSON

Voice Master

Computer: Commodore 64
Manufacturer: Covox
675 Conger Street
Eugene, OR 97402
Price: $89.95

Voice Master is indispensible for an educated 64 who wants a little conversation.



"Cow!" A small girl speaks into a microphone plugged into a Commodore. "You are a cow. Cow says moo." appears on the monitor screen. The girl giggles. The screen goes blank and the Commodore gives a long drawn out "moo-o-o." True, the "moo" sounds as if the cow's throat needs oiling. Not even this most urban of urban cow-girls thinks it's a real cow. Occasionally the 64 insists on mooing when the girl is saying "cat." Sometimes the 64 can't figure out what to do and simply asks for repeats. But usually the cow moos, the cat meows, the duck quacks. The Covox Voice Master is a speech system which not only makes the Commodore say words, but—and this is a far harder task—makes the 64 listen for and recognize words.

For a few dollars more, those interested in a rich and famous lifestyle can even get software for *James,* the electronic servant. Combined with electronic switches, *James* can control up to eight electric devices. Reclining on your gold-brocaded sofa (or wherever you recline), you can simply call "James." "James here," it replies. Or you can program something more respectful. "Dim the lights." The lights dim. "Turn on the TV." The TV comes on. Or even "Call my broker, please." Of course you need an autodial modem for this one, not to mention a broker.

Best of all, Voice Master sells for under $100; with *James* software, $20 more (*James* also requires extra hardware at about $20 per control). A demo disk costs $5. The package includes Voice Master, a box slightly larger than a video remote control. This plugs into the joystick port. A lightweight head set with ear piece and microphone plugs into it. The accompanying disk is not copy-protected. Making a backup for use is not only allowed but encouraged.

Loading and running the menu gives eight choices. One, for example, is a talking calculator which speaks its answers in English, Spanish or German. You can create a clock which announces the time in your own voice—or the voice of someone you like even better. Or play voice-controlled blackjack. You train the computer to recognize your gambling vocabulary and place your bets by speaking. The 64 then cleans you out with all the icy insolence of the born Reno croupier. At least it doesn't send anyone unpleasant around to collect.

While the demonstration programs are interesting, a few stand out as genuinely fascinating. The first shows sound levels as a series of 16 bars on the screen. Any sound in the microphone sets the bars dancing, measuring the amplitude and frequency. You see the shapes of different words, different voices; you see what you hear. It's the best introduction to the nature of sound imaginable.

The next program is Composer. Unlike those programs which have you construct music one note at a time, Voice Master lets you hum or whistle into the microphone. The correct notes appear on the screen. With the audio jack included, you can also play taped music directly into Voice Master. Your song can be replayed, edited to eliminate sour notes, then printed on a dot matrix printer. Watching the notes appear as you hum is great practice for anyone learning musical notation. Even the most tin-eared closet Caruso or bathtub Beethoven can compose a song.

There are limits. The Composer handles only one voice at a time. It's not up to Bachian counterpoint. Admittedly, this Composer is no swinger. Fast music overloads the processor. "Down by the Old Mill Stream" works beautifully, but Twisted Sister gets hashed. As for whether that's a disaster or mere good riddance, you be the judge.

The heart of Voice Master is speech synthesis and voice recognition. The Covox software contains machine-language programs which add about 16 commands to Commodore BASIC. Using these, any BASIC programmer can write programs which include speech. To create speech, for example, you give the command LEARN N. N ranges from 0 to 63, giving a total of 64 sounds of up to eight seconds each. A question mark prompt appears, then anything—a word, music, any sound —said into the microphone will be learned. The question mark spins when a sound is being recorded, so it's easy to see when you must speak. After recording, the command SPEAK N, with N the number of the word learned, speaks the word. Thus, to LEARN and SPEAK five words is this simple:

```
100 FOR N=1 TO 5
110 LEARN N
120 SPEAK N
130 NEXT N
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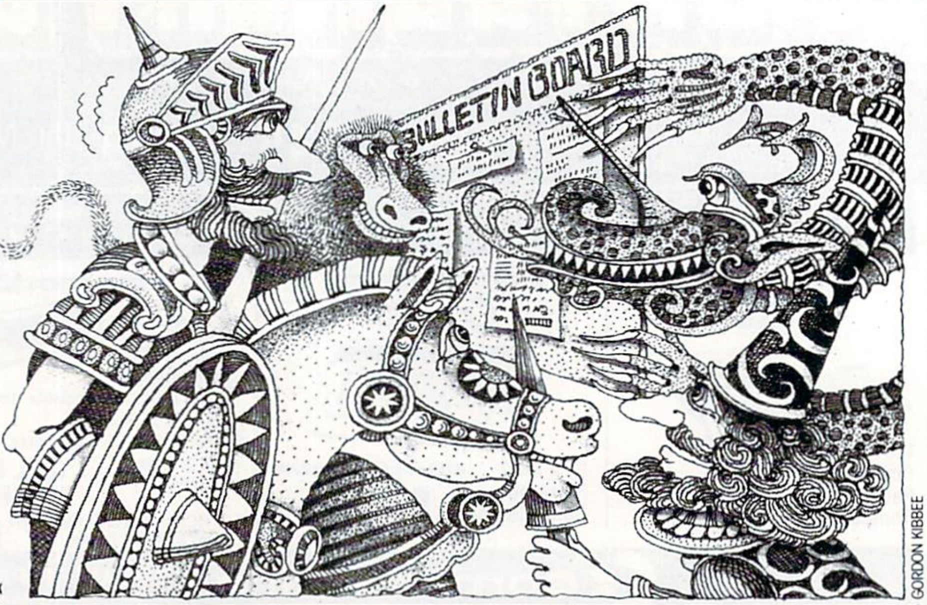
Each word will be retained in memory until it is relearned.

Other commands control such factors as speed and volume. These can create special effects like echoing. Once the 64 has learned its vocabulary, the words and Voice Master program can be saved on disk. As long as the machine-language program is loaded into memory first, any 64 (a 128 version is due very soon) can speak, even if the Covox hardware is not attached. Thus, any BASIC programmer can write programs with cows that moo, bombs that explode, or dungeon masters who invite you into the parlor.

Continued on pg. 117

BY SHAY ADDAMS

Things to Do While Waiting for *Habitat*



News and opinion from a leading explorer of those fantasy realms called adventure games.

For the past few months I've signed onto QuantumLink several times a week to look for *Habitat*, the LucasFilm on-line adventure. It's still not up (though it may be by the time you read this), but a bit of rambling turned up a number of other things for adventurers to do while waiting for *Habitat*. The most practical feature enables you to post messages in which you can ask other Q-Linkers for help on an adventure.

If you've ever been stuck on a puzzle, lost in a maze, or unable to locate the ingredients for that magical spell needed to defeat the Evil Wizard—and who hasn't?—you'll find this message board alone worth the cost of a Q-Link subscription. I had to ask a Q-Guide for directions to the board since it is hidden away in the "Questions and Answers about Commodore" department, a storehouse of diverse information and files. It may have been moved to a new section called Game Help by now, but wherever you find it, this is the place to post a message telling people which game and puzzle has you stumped.

Helpful adventurers will answer your SOS by adding a note to yours or by sending E-mail. If the game is currently being played by a lot of people, you won't even have to leave a message. Someone may have already posted a question about the puzzle that's giving you trouble, so you can just read the answer. Questions about Electronic Arts' adventures, such as *Ultima* and *Moebius*, can also be left on a general board in the company's own department on Q-Link. Another board is reserved just for *The Bard's Tale* players. You can also get to know other adventurers by sending E-mail to those who have left adventure-related messages. Then you can contact them directly. When numerous people are playing the same game, they sometimes get together to discuss hints and strategies in live conferences in the People Connection department. I've already seen such gatherings for *The Pawn* and *Destiny Knight*.

The only inconvenience is that you have to skim through the titles of messages for help on arcade, strategy and other kinds of games to find the ones about adventures, because right now they're all on the same board. But Frank McMahon, who runs the game section under the handle SYSOP FM, tells me they may separate the help messages by category in the future. Help can also be found in the Game Hint Library, where you can download sequential text files full of clues (but not complete solutions) to various games. And you can download utility programs that let you change the stats of your characters in *Ultima IV*, print a map of that game's continents, or obtain powerful characters you can use with *The Bard's Tale* or *Phantasie*.

Q-Link's game section has apparently grown in popularity recently, for McMahon is assisted by SYSHELP (Roger Frank) and was getting a couple of new helpers when I last heard from him. McMahon wrote several of the public domain adventures that are another of Q-Link's adventure-related assets. *Damsels in Distress* was received so well that he has written two sequels, and is also working on a sequel to *Q-Link in Peril*. In the latter, your goal is to get inside Q-Link headquarters and find an ancient spell book before the villain XVector uses it to destroy Q-Link. Many of the scenes in Peril center on interacting with Q-Link's staff and SYSOPs.

McMahon's text adventures can be downloaded, saved on disk, and played after you sign off. They load entirely into RAM, so there's no disk access. You'll find dozens of other adventures listed under Text, Fantasy or Quest in the Public Domain data base—all user-written novelties with titles like *Drooling Baboons*, *Grungy Tower* and *The Bunker* (in which your goal is to track down Adolf Hitler). Like the utilities and text files, these cost nothing more than the time it takes to download them, which won't take long at 1200 baud.

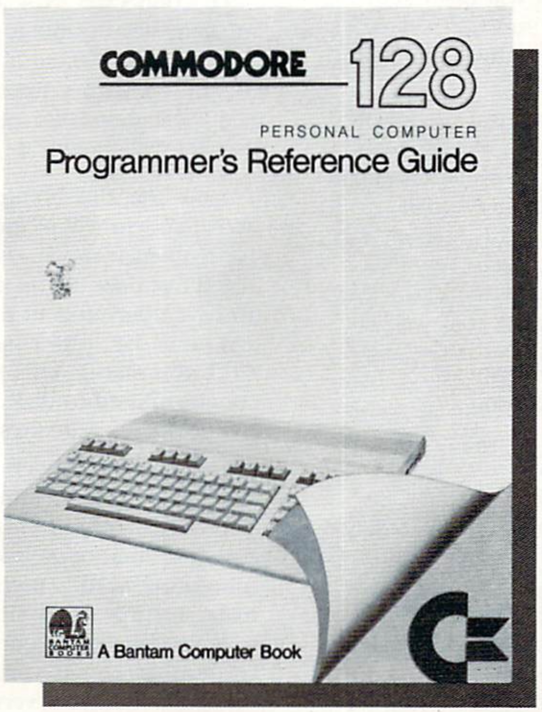
If you want to explore other realms of adventure, check into the Phantasy Guild. This club enables peole to participate in non-computer role-playing games like *Dungeons & Dragons*, *Traveler*, and *Teenage Mutant Ninja Turtles* over the computer in one of three ways: messages, E-mail and live conferences. In each, the action is moderated by a GM (GameMaster) instead of a program, and you play with other gamers instead of alone. These are the ultimate in interactive fiction, for you get to write *your* part of the game as well as read the author's text passages.

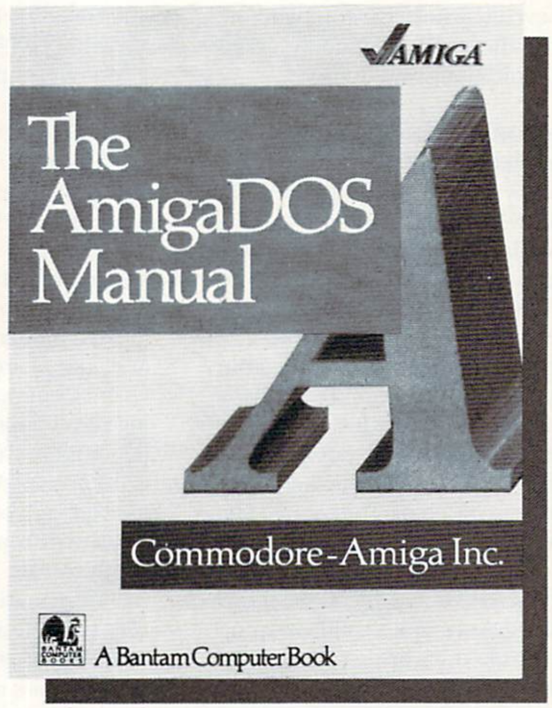
In a message game, the GM posts a plot description on a board reserved for such games (there's one for Fantasy, one for Science Fiction, and one for Other Worlds). When players sign up for the game, he helps them create and equip

Continued on pg. 123

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Commodore 128
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The AmigaDOS Manual
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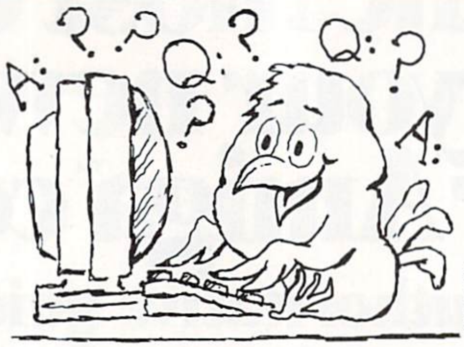
Available at bookstores and computer stores nationwide.

BY SUZANNE McCOACH AND DAN SCHEIN

Connect!

A Guide to Telecommunications Literacy

Become an on-line expert in this ongoing telecommunications tutorial.



BOB CLARK

In our seventh article, we complete the section on the most commonly asked telecommunications questions.

Q: I have a modem and a datasette, but do not have access to a disk drive. Can I still take advantage of telecommunications?

A: Yes! VicTerm Print is a program that you can type in and save to disk or tape. It is compatible on the 64 or the VIC 20 expanded to 8K or 16K. The program is easy to use and includes features for buffer printing and saving of data found on-line. It does not include more advanced downloading or uploading features which are only available in disk-based programs. The reason for this is because the protocols used for file transfers are very timing sensitive and the slow speed of the datasette unit cannot keep up with the file transfer protocol. If you would like a listing of VicTerm Print to type in, send a written request to the attention of Dan Schein in Commodore's Communications Department.

Q: How can I program the function keys using the *Common Sense* terminal program?

A: To pre-enter information (network numbers, your user ID, and so on) into the functions keys via *Common Sense*, you first need to load the program into memory. Press the Commodore Key and K then press the function key number that you want to define. Now just enter exactly the definition you want. When finished press RETURN. You should save the function keys to disk for future use so you can load them each time you are ready to connect. To save the keys, press the Commodore key and K then S. A prompt will then appear to enter a filename. Remember to enter a name that you will easily remember. To load the function keys back into memory, press the Commodore key and K then L.

Q: I recently purchased a modem and want to get started. However, I would like to begin on local bulletin board services to get familiar with my modem as well as save on consumer network charges. Any ideas?

A: Local bulletin boards are a great starting point for beginners as well as information sources for the experienced modem user. To locate the available boards in your area, check with a Commodore user group. A listing of all approved user groups can be found in the back of each issue of *Commodore Magazine*. By joining a user group, you not only have the advantage of hands-on help from other Commodore product owners, but the information exchange can be very valuable as your computer interests change and expand. Many user groups maintain a bulletin board service or may be a member of other local services. Also, check with local computer stores as they are often alerted to bulletin boards in the area for users to join. By becoming familiar with several bulletin board services, you will be able to determine which one fits your telecommunication need. You may want to join a larger consumer network, depending on your programming and computer needs in the future.

Q: I have heard that a 300-baud modem can actually communicate at a rate faster than 300 baud. Is this true?

A: Baud rate is a unit of measurement for the transmission of data and roughly translates into bits per second. All Commodore modems except the Modem 1200/1670, are designed to operate at 300 baud; that is, they transmit at 300 signal elements (bits) per second (the Modem 1200 can operate at 300 or 1200 baud). We do know that some 300-baud modems allow you to set your baud rate higher and they still operate. The highest baud rate we have seen a 300-baud modem effectively operate at is a baud rate of 450. We do not know of any commercial database services or BBS's that allow you to connect at 450 baud, but we have seen several BBS's that do give you the option to change your baud rate once connected. Not all 300-baud modems will be able to operate at a baud rate of 450, so a little experimentation with your modem will find the fastest baud rate that your modem will operate at.

Q: I know the ATA command on the 1670 modem will pick up a call and be in originate mode. Is there a command that does the opposite?

A: To have your modem pick up a call and be in the answer mode, use the ATD command. This is the same command used to dial your modem and gives the desired result.

Q: I have the 1670 modem, but it won't work correctly sometimes. Why?

A: This is a hard question to answer, but here are three of the most common mistakes new 1670 users make. First, make sure that any device connected to the serial port of your 64 or 128 is turned on. This is very important. The 1670 modem is very sensitive to devices connected to the serial bus that are not activated (turned on). The second most common mistake is not entering modem commands in upper case. All 1670 commands must be entered in capital letters. Lower case will not work. Also, entering AT followed by items that are not a legal command can cause the 1670 modem to get confused. It will echo OK, but will not respond. The only way to correct this is to reset your modem. The only way to reset your modem is by resetting your computer.

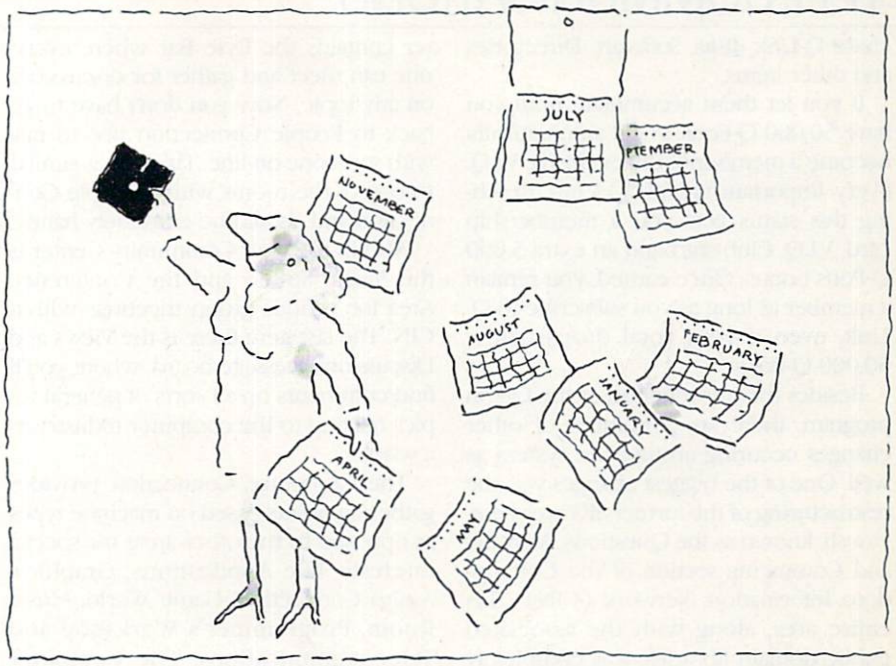
We'd like to thank all those readers who have sent in their questions and problems. See you on-line! ■

Suzanne McCoach is Telecommunications Manager at Commodore. Dan Schein is Network Coordinator.

BY ROBERT W. BAKER

Inside QuantumLink

Explore the inner workings of the QuantumLink telecommumication service with network pro Bob Baker.



LINDA CLARK

If you get a lot of E-Mail like me, it's pretty handy to be able to save some or all of the messages onto disk. However, saving a large number of messages, all in separate files, creates a lot of work later when you go to read or print the data. Not many people know that you can append additional messages to an existing file when you save them to disk. All you have to do is use the name of an existing file when you save a message to disk. If the filename already exists, the new message is simply appended to the existing file.

The easiest technique I've found is to save the first message with a filename of something like MAIL xx/yy, where xx/yy is the current date. Then all additional messages to be saved on that day can be appended to the same file simply by using the same filename. Later, when you go to read or print the file, all the messages will come out together with a separating line that's inserted by the Q-Link software.

The filename shown above is short and easy to remember. Having the date as part of the filename makes it easier to find things later, and provides a handy log if needed. By the way, this same technique also works when using the screen save feature (F3) for saving messages from message boards or other data displayed by the system.

If for some reason you save a group of messages or text as separate files, they can still be combined into a single file using the built-in DOS copy command. The copy command allows concentrating up to four sequential data files into a single destination file in one operation. The only limitation is that the filename must be fairly short, since the entire command line between the quotes is limited to 58 characters total.

The procedure is pretty simple. After opening the command and error channel, you can then issue the COPY command and close the channel when done to copy and concatenate the files, creating the one new file.

```
OPEN 15,8,15
PRINT#15,"c0:new-file=0:file1,0:
   file2,0:file3,0:file4"
CLOSE 15
```

All original files are left untouched. The only disadvantage of this method is that there is no separation between messages or blocks of text like that inserted by the Q-Link software when appending data to an existing file.

Another extremely handy feature is the ability to send E-Mail to yourself. This is a quick and simple way to record information for later or post a reminder message for the next time you log on. Just send E-Mail as usual, but use your own user name when asked who the E-Mail is for. If you have more than one user name, you can reserve one name specifically for E-Mail notes to yourself. Just don't forget to check for mail under the alternate user names every once in a while.

If you're concerned about plus charge times, watch what you're doing after leaving a plus service area. When you press the F5 key to exit a plus service area, the information is not passed back to the main Q-Link system. Only your 64/128 knows that you've pressed F5 to exit the current area and redisplays the preceding menu or message. Q-Link doesn't know you've changed areas until you select and enter another service area from one of the menus.

If you watch the plus sign at the top of your screen, you'll see that it still stays on when you exit a plus area and return to a basic service (non-plus charge) area of the system. To get rid of the plus sign and stop accumulating plus charges for your time, you'll actually have to select and enter a basic service area. You can then exit that area and return to the top menu to do whatever you desire without accumulating further plus charges. The plus sign at the top of your screen is the clue. Whenever it's displayed you are accumulating plus charges even if you're not in a plus service area any more.

Hot Off the Wire

By the way, don't forget that your plus time charges now earn Q-Pons at the rate of 100 Q-Pons for every full hour of plus time. This is in addition to 500 Q-Pons you get every month just for being a Q-Link subscriber. Additional Q-Pons are earned for using plus time between 2 AM and 7 AM local time (100 for each hour) or for using over 10 hours of plus time in a calendar month (250 bonus).

For complete details on the Q-Pon program, check out the information available in the Customer Service Center. You'll find complete information and can easily check your current Q-Pon total any time you're on-line, as well. Once you start accumulating Q-Pons, you can use them to purchase merchandise in the Q-Link store. You can use them to pur-

chase Q-Link disks, Software Directories and other items.

If you let them accumulate until you have 50,000 Q-Pons, you'll automatically become a member of the exclusive V.I.Q. (Very Important Q-Linker) Club. Reaching this status gets you a membership card, V.I.Q. Club shirt and an extra 5,000 Q-Pons bonus. Once earned, you remain a member as long as you subscribe to Q-Link, even if your total drops below 50,000 Q-Pons.

Besides the introduction of the Q-Pon program, there are a number of other changes occuring around the system as well. One of the biggest changes was the restructuring of the former SIG areas previously known as the Questions, Answers and Comments section of the Commodore Information Network (CIN). This entire area, along with the associated public domain libraries, was completely redone and greatly expanded.

In its first few days of use, there were the usual range of both positive and negative comments as everyone attempted to get acquainted with the new environment. All in all, the transition seemed to be going pretty smoothly and the majority of people seemed to favor the new structure. The biggest complaint appeared to be the extra keystrokes required to reach the former special interest groups within the new structure. Hopefully, the extra features will be worth the small inconvenience of getting there.

Within the newly created Commodore Community, the Community Center contains the Byte Bar where everyone can meet and gather for discussions on any topic. Now you don't have to go back to People Connection just to talk with someone on-line. This area is similar to one of the rooms within People Connection and should be extremely handy.

Also in the new Community Center is the Music Studio and the Conference Area for various group meetings within CIN. The last item there is the Views and Discussions message board, where you'll find comments on all sorts of general topics relating to the computer industry as a whole.

The Computer Connection provides gathering points based on machine types as opposed to the other areas for special interests, like Applications, Graphics, Amiga Connection, Game World, Music Room, Programmer's Workshop and Telecommunications. The Computer Connection has message boards for the 64, 128, VIC 20, Plus/4-C16, and PET/CBM systems as well as an area for CP/M.

Each of the areas within the Commodore Community have a place for finding current news and events, access to the public domain software libraries, and an article section for reading longer text messages on special topics. Another new feature is the Workshop areas with their special message boards and libraries, where people can meet and discuss technical issues or projects, exchange ideas, get help, and so on.

Other changes around the system include the Welcome Room, where new users are greeted personally by a QGuide who will help them get acquainted with the system. New Software Directories are being generated; the second edition was just going to print back in April. Watch for announcements of updates and availability of future new editions.

The expanded user profile now allows a new and expanded Matchmaker service and Membership Directories. Now you can easily find other users with similar interests for engaging conversations, exchange of ideas or information, or whatever other reasons. Enter your request and, hopefully, get your response by E-Mail the following day.

There are plenty of other changes in the works, all intended to expand and improve Q-Link for everyone using the system. The people at Q-Link are constantly trying to improve all areas of the system and are doing their best to react to comments, suggestions and complaints. Believe it or not, they do listen to user input.

Before I wrap things up, don't forget to check out the new Library area within my New Product Information section of CIN. There are a number of product specifications, catalogs, documentation and demo files available from a variety of companies. This area is growing steadily.

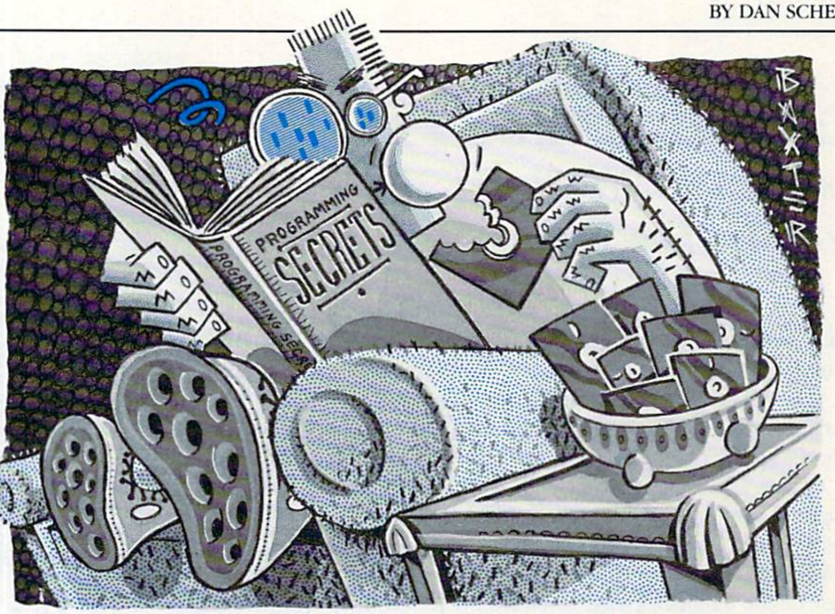
As usual, your questions, comments and suggestions are always welcome. C

Bob Baker is in charge of the New Products Information area on the QuantumLink network. He can be reached on Q-Link via E-mail addressed to RBAKER.

BY DAN SCHEIN

Tech Notes

A Look at the Latest



ART BAXTER

This month some interesting 128 products crossed my desk: two new books, *Commodore 128 Programming Secrets* and *Mastering Disk Operations on the Commodore 128;* the *1541/1571 Drive Alignment* program; and *TSDS*, the Total Software Development System.

Osborne McGraw-Hill's *Commodore 128 Programming Secrets* is a well written and very informative book that ranges from 64 mode through 128 mode into CP/M mode. Disk operations and the 128's native 7.0 version of BASIC are also well covered. This book is recommended for users from the beginner through the advanced programmer, covering areas like the Kernal, screen displays and video RAM, and input/output operations of the 128. Included are useful items like conversion tables, character sets, and how to display 80-column text on a monochrome composite monitor.

Sybex's *Mastering Disk Operations on the Commodore 128* is completely dedicated to CP/M. This book is an indispensable aid to anyone who has the slightest interest in the CP/M mode of their 128. For the beginner, this book teaches you the basics of CP/M. The book grows as your knowledge of CP/M grows, thereby making this book very useful to even the experienced CP/M user. Included are items like CP/M commands and very straightforward explanations. Great detail on file-handling with PIP, extended guide of ED, and lots more. If you have any interest in the CP/M mode of your 128, this book is for you.

1541/1571 Drive Alignment from Free Spirit Software is a nice utility for checking the alignment of your 1541 or 1571 drive. As with other programs of this type, if your drive is badly out of alignment, you will not be able to load this program. You can, however, load this program from a second drive if need be. This program runs on a 128 in 128 mode or on a 64. Included is a manual that explains how to do the actual alignment of your disk drive.

The instructions for using the drive alignment software is not contained in the manual, but on the disk. Disk instructions are nice for a quick reference, but I would prefer to see the full instructions printed in the manual. Overall, I think this is a well done program. If you are the do-it-yourself type, this may be just the help you're looking for.

And NoSync's *TSDS* is a total software development system for the 128 and 64. The enclosed disk has both the 128 mode (40- and 80-column) and 64 version included. *TSDS* is actually six programs in one—it consists of a text editor, macro assembler, sprite editor, unassembler, chrset editor, and sound effects editor.

The text editor works in conjunction with the BASIC in your computer. Added features include directory type commands, up/down scrolling, simplified output to printer, and more. The assembler is a symbolic type of assembler and seems to be very flexible. Symbolic assemblers use mnemonics to allow you to write a program in a symbolic format. Mnemonics represent the operations of the processor. Using an assembler of the symbolic type results in a more readable and more easily modified code.

The sprite editor allows you to edit up to 256 sprites at one time. This is a great thing if you need to swap and compare sprites when writing a program. The unassembler takes a machine-language program and unassembles it into a source code that can be modified and assembled again. This is especially useful for making changes to a program that you do not have the source code to.

The sound effects editor allows you to edit up to 256 sounds. The sound effects editor can create a sound, edit sounds, and add or delete sounds.

The last item is a chrset editor. A chrset editor allows you to edit character sets and then draw pictures with this character set. This is most useful when designing screens for various levels in a program. If you are interested in writing your own program, this program will be a great help. C

Commodore 128 Programming Secrets
by William M. Wiese, Jr.
Osborne McGraw-Hill
2600 Tenth Street
Berkeley, CA 94710

Mastering Disk Operations on the Commodore 128
by Alan R. Miller
Sybex
2344 Sixth Street
Berkeley, CA 94710

1541/1571 Drive Alignment
Free Spirit Software
538 South Edgewood Avenue
La Grange, IL 60525

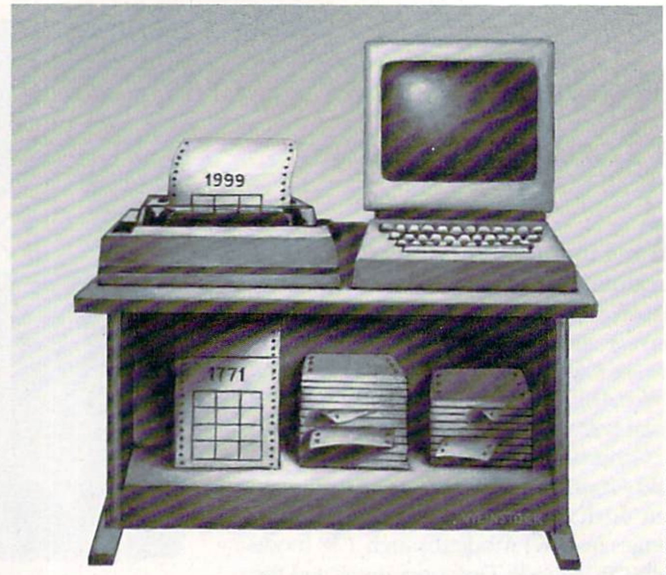
TSDS—Total Software Development System
NoSync
#103 2334 Marpole Street
Port Coquitlam, B.C.
V3C 2A2 Canada

C

BY BRUCE JAEGER

Calendar Maker

for the VIC 20, Plus/4, Commodore 64 and 128



BRUCE WEINSTOCK

A perpetual calendar program is certainly nothing new. Some let you input a date and then after a series of calculations tell you which day of the week that day fell on. Others, a bit more sophisticated, will print out a calendar for a given month. Calendar Maker prints out a year's worth of monthly calendars on a page, and by entering a range of years at the start of the program, you can print a series of yearly calendars for as long as you have paper in your printer!

Why no dates before the year 1752? That's the year that most of the English-speaking world switched from the Julian Calendar (attributed to Julius Caesar) to the Gregorian Calendar (named after Pope Gregory XIII). In the process, 11 days had to be added to the calendar. George Washington was born on February 11, 1732 (Julian); we now celebrate his birthday on February 22 (Gregorian). The upshot of all this is that the program won't work on dates before 1752.

Calendar Maker works on all Commodore computers with any Commodore or Commodore-compatible printer. **C**

Print a full year's calendar on a single sheet of paper for any year from 1752 to 2001.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Calendar Maker

```
160 GOTO 200'BDBC
170 OPEN 15,8,15,"S0:CALENDAR MAKER"
    : CLOSE 15'CLDJ
180 SAVE "0:CALENDAR MAKER",8
    : END'CDTI
190 REM'BARE
200 PRINT CHR$(147)'CFBX
210 DIM D(35),MO$(12),M$(12,7),DM(12),
    FD(12)'BLCE
220 FOR X = 1 TO 12 : READ MO$(X)
    : NEXT'FMSD
230 DATA JANUARY,FEBRUARY,MARCH,
    APRIL'BDYH
240 DATA MAY,JUNE,JULY,AUGUST,
    SEPTEMBER'BFQJ
250 DATA OCTOBER,NOVEMBER,
    DECEMBER'BAAI
260 FOR X = 1 TO 12 : READ DM(X)
    : NEXT'FLVH
270 DATA 31,28,31,30,31,30,31,31,30,
    31,30,31'BKZK
280 FOR X = 1 TO 12 : READ FD(X)
    : NEXT'FLOJ
290 DATA 0,3,3,-1,1,4,-1,2,5,0,3,
    5'BADK
300 SP$="[SPACE24]":REM 24 SPACES'CMCE
310 DN$=" SU MO TU WE TH FR SA[SPACE3]
    "'BDHF
320 DL$="---------------------"
    :REM 21 DASHES'CMQH
330 PRINT CHR$(147)CHR$(18)"CALENDAR
    MAKER"'DJOH
340 PRINT'BACB
350 INPUT "START WITH YEAR";Y1'BDUH
360 IF Y1<1752 THEN 330'DJLG
370 PRINT'BACE
380 PRINT "(NULL RETURN =" Y1 ")"'BCZK
390 Y2=Y1'BEXH
400 PRINT'BACX
410 INPUT "END WITH YEAR";Y2'BDRD
420 IF Y2<1752 THEN 330'DJMD
430 PRINT'BACB
440 PRINT : PRINT"CALCULATING..."'CBRH
450 CLOSE 4 : OPEN 4,4'CFOF
460 FOR YR = Y1 TO Y2'DGAH
470 PRINT : PRINT CHR$(18)YR'DHBI
480 Z=(YR/100) : C=INT(YR/100)
    : A=Z-C'HVQP
490 IF A=0 THEN 530'DFLJ
500 Z=(YR/4) : C=INT(YR/4)
    : A=Z-C'HRFI
510 IF A=0 THEN XD=1 : GOTO 560'FJYF
520 GOTO 550'BDJC
530 Z=(YR/400) : C=INT(YR/400)
    : A=Z-C'HVWL
540 IF A=0 THEN XD=1 : GOTO 560'FJYI
550 XD=0'BDAF
560 F=INT(YR/4) : G=INT(YR/400)
    : H=INT(YR/100)'JYJQ
570 J=F+G-H'DEMJ
```

JIFFIES/CALENDAR MAKER

```
580 L=(YR+J)/7 : M=INT((YR+J)/7)'HRDP
590 Q=(L-M)*7 : YS=INT(Q)
    : R=Q-YS'HRER
600 IF R>Ø.9 THEN YS=YS+1'FJBF
610 YS=YS-XD'CGFE
620 IF YS<Ø THEN YS=YS+7'FIVH
630 FOR MH=1 TO 12'DFAG
640 MN$=MO$(MH) : PRINT LEFT$(MN$+SP$,
    20);'EXBL
650 DM = DM(MH) : IF MH=2 THEN
    DM=DM+XD'GSJN
660 FD=YS+FD(MH)+XD : IF MH=1 THEN
    FD=YS'HUUQ
670 IF MH=2 THEN FD=YS+3'FILM
680 IF FD>6 THEN FD=FD-7'FIYN
690 IF FD<Ø THEN FD=FD+7'FITO
700 W=20'BDGC
710 YR=INT(YR)'CGOF
720 M$(MH,Ø)=LEFT$(MN$+SP$,24)'DTNJ
730 M$(MH,1)=DN$'BLCH
740 M$(MH,2)=DL$'BLBI
750 FOR X = 1 TO 35 : D(X)=Ø
    : NEXT'FLPL
760 Y=1 : Z=Y : FOR X = FD+1 TO 35
    : D(X)=Z'HSRQ
770 Y=Y+1 : Z=Y : IF Z>DM THEN
    Z=Ø'HMIQ
780 NEXT : WE=Ø : Y=Ø'DHYM
790 FOR X = 1 TO 35 : Y=Y+1
    : IF Y>6 THEN Y=Ø'JNOT
800 IF D(X)=Ø THEN M$(MH,WE+3)=M$(MH,
    WE+3)+"[SPACE3]" : GOTO 820'IESO
810 M$(MH,WE+3) = M$(MH,
    WE+3) + RIGHT$( "[SPACE4]
    "+ STR$(D(X)),3)'HFXO
820 IF Y=Ø THEN WE=WE+1'FHYJ
830 NEXT X'BBRF
840 NEXT MH'BCXH
850 PRINT#4:PRINT#4,YR'CGSJ
860 PRINT#4:PRINT#4:LN=4'DHOL
870 FOR X = Ø TO 12 : FOR Y = Ø TO
    7'GIVO
880 M$(X,Y) = LEFT$(M$(X,Y)+SP$,
    24)'DWMR
890 NEXT Y : NEXT X'CDNM
900 FOR X=Ø TO 7:PRINT#4,"[SPACE3]
    "M$(1,X)M$(2,X)M$(3,X):NEXT
    :PRINT#4:PRINT#4'HHMO
910 FOR X=Ø TO 7:PRINT#4,"[SPACE3]
    "M$(4,X)M$(5,X)M$(6,X):NEXT
    :PRINT#4:PRINT#4'HHVP
920 FOR X=Ø TO 7:PRINT#4,"[SPACE3]
    "M$(7,X)M$(8,X)M$(9,X):NEXT
    :PRINT#4:PRINT#4'HHFQ
930 FOR X=Ø TO 7:PRINT#4,"[SPACE3]
    "M$(1Ø,X)M$(11,X)M$(12,X):NEXT
    :PRINT#4:PRINT#4'HKGR
940 FOR X = 1 TO 22 : PRINT#4
    : NEXT'FHIL
950 NEXT YR : CLOSE 4 : END'DFTK
```

END

BY PENNY DEGROFF

What Goes Here?

for the Commodore 64

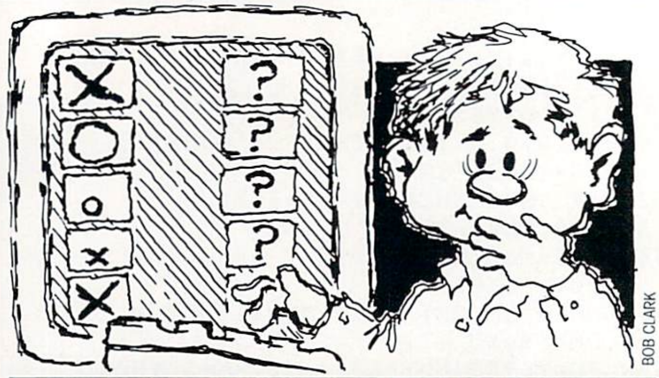
After the title screen is shown, select a difficulty level by pressing a number key from 1 to 5. Because the GET statement is used throughout the program, there is no need to press the RETURN key. Level 1, the least difficult, has 5 characters, level 2 has 10 characters, level 3 has 15 characters, and so on.

Next choose how you want to match the pattern. Just press the number key that corresponds to the method you wish to use. Two grids will appear. The left one is filled with X's and O's, the right one is empty. Study the characters carefully, noting if each is large or small. After 15 seconds, the characters will disappear. Above the two grids, a diagram with the four characters will appear. Each character will be in its own numbered square.

A question mark will be placed in the right grid. If you choose the in-order option, it will be in the first square of the first row. Otherwise, the computer will randomly pick a square.

Choose the character that you think is in the corresponding square of the left grid by pressing a number key from 1 to 4. The correct character will reappear in the left grid. If you matched it, your score (shown at the top of the screen) will increase by one point.

Play continues until all squares are filled. Then the option to play again is given.



What Goes Here? tests your powers of observation by letting you try to duplicate a specific pattern of characters.

You may wish to change the length of time the characters are shown at the beginning of the game. Simply increase or decrease the value of TI$ in line 320 of the program.

In addition, you may prefer different characters in the game. Lines 350 and 610 control this. Look at pages 132-134 of the Commodore 64 user's guide. Let's say you want to change the O to a diamond. List line 360 and move the cursor to the O. Now press the shift key and Z. Be sure to press RETURN. Then list line 610 and change the 15 to 90. The other characters may be changed in the same manner.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

What Goes Here?

```
10 DIM D$(23),A(4),B(25),C(25),G(25)
   :PRINT CHR$(8)CHR$(142)'ENXG
20 D$(0)=CHR$(19):FOR X=1 TO 23
   :D$(X)=D$(X-1)+CHR$(17):NEXT'KGKK
30 A$="WHAT GOES HERE?"
   :PRINT CHR$(147):POKE 53280,2
   :POKE 53281,15:POKE 646,2'GGWN
40 PRINT D$(11)TAB(12)"[CMDR A,
   SHFT *15,CMDR S]":PRINT TAB(12)"
   [SHFT -,SPACE15,SHFT -]"'ENWV
50 PRINT TAB(12)"[CMDR Z,SHFT *15,
   CMDR X]":FOR D=1 TO 1000:NEXT'GLIT
60 PRINT D$(12)TAB(13);
   :FOR X=1 TO LEN(A$):PRINT MID$(A$,
   X,1);'ICLM
70 FOR D=1 TO 500:NEXT:NEXT
   :FOR X=54272 TO 54295:POKE X,0:NEXT
   :POKE 54296,15'LIYQ
80 POKE 54277,5:POKE 54284,10'CQBI
90 READ H,L:IF H=0 THEN 130'EJMJ
100 POKE 54273,H:POKE 54280,H
    :POKE 54272,L:POKE 54279,L'EGXD
110 POKE 54276,17:POKE 54283,33
    :FOR D=1 TO 200:NEXT'GYLE
120 POKE 54276,16:POKE 54283,32
    :GOTO 90'DUWC
130 FOR X=54272 TO 54284:POKE X,0
    :NEXT'FQWE
140 FOR X=1 TO 4:READ A(X):NEXT
    :B(1)=1471:C(1)=1488'HCDI
150 FOR X=2 TO 5:B(X)=B(X-1)+2
    :C(X)=C(X-1)+2:NEXT'KBVM
160 FOR X=6 TO 25:B(X)=B(X-5)+80
    :C(X)=C(X-5)+80:NEXT'KEQN
170 PRINT CHR$(147):POKE 53280,6
    :POKE 53281,14:POKE 646,6'FDKK
180 PRINT D$(12)TAB(5)"SELECT
    DIFFICULTY LEVEL(1-5)"'CIFN
190 GET Z$:E=VAL(Z$):IF E<1 OR E>5
    THEN 190'IQMM
200 PRINT CHR$(147):POKE 53280,1
    :POKE 53281,3:POKE 646,1'FCAE
210 PRINT D$(11)TAB(11)"MATCH
    CHARACTERS"'CJSE
220 PRINT TAB(11)"<1> AT RANDOM"
    :PRINT TAB(11)"<2> IN ORDER"'EHDI
230 GET Z$:F=VAL(Z$):IF F<1 OR F>2
    THEN 230'IQHH
240 IF F=1 THEN FOR X=1 TO 25:G(X)=0
    :NEXT'INIH
250 PRINT CHR$(147):POKE 53280,0
    :POKE 53281,0:POKE 646,5'FCAJ
260 PRINT D$(10)TAB(6)"[CMDR A,SHFT *,
```

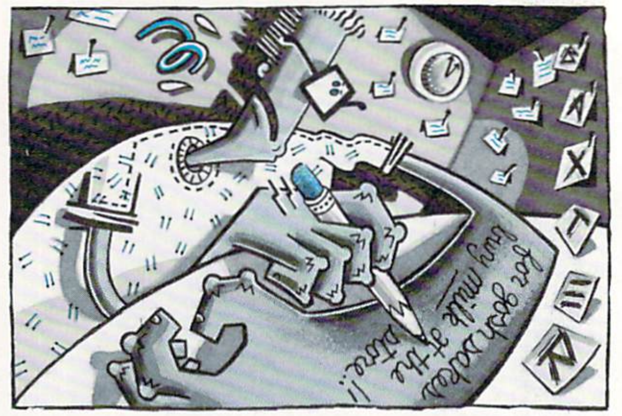
```
    CMDR R,SHFT *,CMDR R,SHFT *,
    CMDR R,SHFT *,CMDR R,SHFT *,
    CMDR S,SPACE6,CMDR A,SHFT *,
    CMDR R,SHFT *,CMDR R,SHFT *,
    CMDR R,SHFT *,CMDR R,SHFT *,
    CMDR S]"'CILV
270 PRINT TAB(6)"[SHFT -] [SHFT -]
    [SHFT -] [SHFT -] [SHFT -]
    [SHFT -,SPACE6,SHFT -] [SHFT -]
    [SHFT -] [SHFT -] [SHFT -]
    [SHFT -]":IF E=1 THEN 300'FIQU
280 FOR X=1 TO E-1:PRINT TAB(6)"
    [CMDR Q,SHFT *,SHFT +,SHFT *,
    SHFT +,SHFT *,SHFT +,SHFT *,
    SHFT +,SHFT *,CMDR W,SPACE6,
    CMDR Q,SHFT *,SHFT +,SHFT *,
    SHFT +,SHFT *,SHFT +,SHFT *,
    SHFT +,SHFT *,CMDR W]"'GHNC
290 PRINT TAB(6)"[SHFT -] [SHFT -]
    [SHFT -] [SHFT -] [SHFT -]
    [SHFT -,SPACE6,SHFT -] [SHFT -]
    [SHFT -] [SHFT -] [SHFT -]
    [SHFT -]":NEXT'DDPT
300 PRINT TAB(6)"[CMDR Z,SHFT *,
    CMDR E,SHFT *,CMDR E,SHFT *,
    CMDR E,SHFT *,CMDR E,SHFT *,
    CMDR X,SPACE6,CMDR Z,SHFT *,
    CMDR E,SHFT *,CMDR E,SHFT *,
    CMDR E,SHFT *,CMDR E,SHFT *,
    CMDR X]"'CCBP
310 FOR X=1 TO E*5:POKE B(X)+54272,3
    :POKE B(X),A(INT(RND(0)*4)+1)'LHWL
315 NEXT:TI$="000000"'CEJG
320 IF TI$<>"000015"THEN 320'EGYE
330 FOR X=1 TO E*5:POKE B(X)+54272,0
    :NEXT:POKE 646,1'IXNJ
340 PRINT D$(5)TAB(11)"[CMDR A,
    SHFT *3,CMDR R,SHFT *3,CMDR R,
    SHFT *3,CMDR R,SHFT *3,CMDR S]
    "'CIHQ
350 PRINT TAB(11)"[SHFT -]1 O[SHFT -]
    2 X[SHFT -]3 [SHFT V,SHFT -]4
    [SHFT W,SHFT -]"'CDTL
360 PRINT TAB(11)"[CMDR Z,SHFT *3,
    CMDR E,SHFT *3,CMDR E,SHFT *3,
    CMDR E,SHFT *3,CMDR X]"'CDJR
370 POKE 646,13:S=0:PRINT
    D$(2)TAB(9)"CHARACTERS MATCHED: 0"
    :I=0'FUPQ
380 I=I+1:IF I>E*5 THEN 560'GKTL
390 IF F=2 THEN 420'DFQI
400 R=INT(RND(0)*E*5)+1
    :IF G(R)=1 THEN 400'JSQH
410 G(R)=1:POKE C(R),63
    :POKE C(R)+54272,7:GOTO 430'FEII
420 POKE C(I),63:POKE C(I)+54272,
    7'DTYF
430 GET Z$:J=VAL(Z$):IF J<1 OR J>4
    THEN 430'IQXJ
440 IF F=1 THEN 480'DFVE
450 POKE C(I),A(J):POKE C(I)+54272,3
    :POKE B(I)+54272,3'FIPM
460 IF PEEK(B(I))=PEEK(C(I))THEN
    520'FPOK
470 GOTO 500'BDEG
480 POKE C(R),A(J):POKE C(R)+54272,3
    :POKE B(R)+54272,3'FIMQ
490 IF PEEK(B(R))=PEEK(C(R))THEN
    520'FPHN
500 POKE 54277,45:POKE 54272,20
    :POKE 54273,5:FOR T=1 TO 3
    :POKE 54276,33'HNDL
510 FOR D=1 TO 150:NEXT:POKE 54276,32
    :FOR D=1 TO 30:NEXT:NEXT
    :GOTO 550'LBWL
520 POKE 54277,15:POKE 54272,70
    :POKE 54273,100:FOR T=1 TO 3
    :POKE 54276,33'HPVN
530 FOR D=1 TO 75:NEXT:POKE 54276,32
    :FOR D=1 TO 20:NEXT:NEXT'KVLM
540 S=S+1:PRINT D$(2)TAB(28)S'ENVI
550 FOR D=1 TO 1500:NEXT:GOTO 380'FLSJ
560 POKE 646,7:PRINT D$(23)TAB(5)
    "GAME OVER....PLAY
    AGAIN(Y/N)"'DOBQ
570 GET Z$:IF Z$="Y"THEN 170'EIWK
580 IF Z$<>"N"THEN 570'EFEK
590 SYS 64759'BFWJ
600 DATA 16,195,21,31,18,209,22,96,28,
    49,25,30,31,165,37,162,33,135,0,
    0'BMJM
610 DATA 15,24,86,87'BLAD
```

END

BY R. HAROLD DROID

1541 Disk Stamper

for the Commodore 64



ART BAXTER

Here's a program for people who are extremely organized, somewhat lazy, or the sort of person who leaves cryptic messages lying around in obscure places. It reads and/or writes a short two-line message to an unused part of a 1541 disk. The message is scratch-proof, verify-proof, and doesn't show up on the disk directory. Yet it's there any time you want to read it.

Maybe you just want to make a note of when a disk was formatted or who you got it from. Or maybe there's a special trick to loading a program you'd like to jot down directly on the disk. Or maybe you'd like to take credit for your creations in a less obvious way than emblazoning your name on the disk directory.

The message is stored on track 18 sector 0 of a 1541 disk. This block holds the BAM (block allocation map), the disk name, and the disk ID. There's a number of unused bytes at the end of this sector that are untouched by the operating system—this is where we store our message.

Using the program is simple enough: type RUN, pop the disk in at the prompt, and press RETURN. If there's a message on the disk, it's displayed; otherwise, you get a blank line. You also get a blinking cursor, which is your invitation to edit the existing message or compose a new one.

Enter or edit the message with alphanumeric and graphic characters and the cursor controls. Insert and delete, reverse characters and color changes aren't allowed. Any keypress which would take you outside the 2-line 79-character limit is ignored.

Read and/or write a short two-line message to an unused part of a 1541 disk.

When you're done viewing or editing, press F1 to rewrite the message back to the disk. That's all there is to it! Now you have a handy place to store your notes to yourself without dirtying up the directory or the disk jacket or fumbling through umpteen little scraps of paper. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

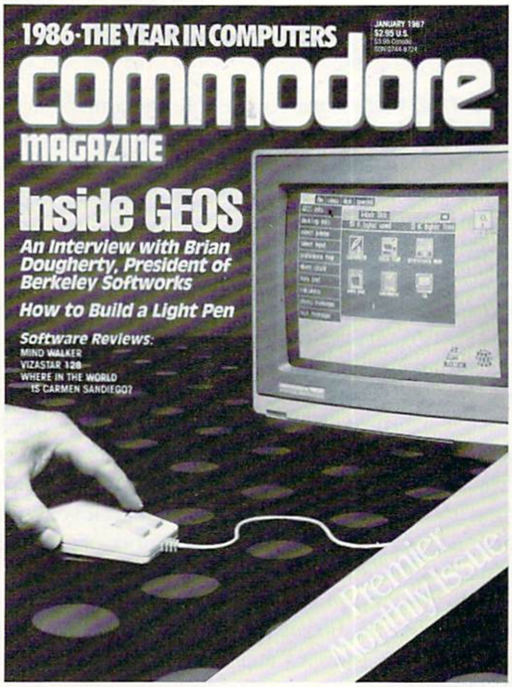
1541 Disk Stamper

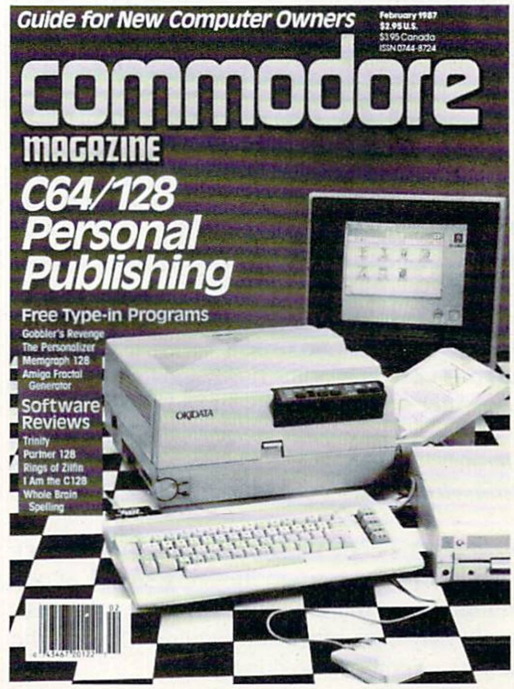
```
10 REM ************************'BXJB
20 REM       READ BLOCK'BJWB
30 REM ************************'BXJD
40 POKE 198,Ø:PRINT"INSERT DISK AND
   PRESS [RVS]RETURN"'CGGK
50 PRINT"PRESS [RVS]F1[RVOFF]
    TO REWRITE":PRINT'CBXI
60 GET A$:IF A$<>CHR$(13)THEN 6Ø'GLDI
70 OPEN 15,8,15:OPEN 2,8,2,"#"
   :PRINT#15,"U1";2;Ø;18;Ø
   :PRINT#15,"B-P";2;177'EMMO
80 FOR I=177 TO 255:GET#2,A$
   :A$=A$+CHR$(Ø)'HVUM
90 IF(ASC(A$)AND 127)<32 THEN
   A$=CHR$(32)'HRSM
100 PRINT A$;:NEXT'CETV
110 REM ************************'BXJA
120 REM       EDIT BLOCK'BJGA
130 REM ************************'BXJC
140 PRINT CHR$(146)CHR$(145);
    :POKE 198,Ø:POKE 211,Ø'FXAG
150 S=PEEK(211)+PEEK(2Ø9)+PEEK(21Ø)
    *256:POKE S+54272,PEEK(646)
    :F=128'LMBP
160 POKE S,PEEK(S)+F:F=-F:D=1'GMOH
170 GET A$:IF A$<>""THEN 2ØØ'FIEG
180 D=D+1:IF D=6Ø THEN 16Ø'FKPI
190 GOTO 17Ø'BDHF
200 POKE S,PEEK(S)AND 127
    :IF(ASC(A$)AND 127)<32 THEN
    23Ø'IXSF
210 PRINT A$;:IF POS(Ø)>78 THEN PRINT
    CHR$(157);'HPKE
220 GOTO 15Ø'BDFY
230 IF A$=CHR$(29)THEN IF POS(Ø)<>78
    THEN 21Ø'JOHH
240 IF A$=CHR$(157)THEN IF POS(Ø)<>Ø
    THEN 21Ø'JOTI
250 IF A$=CHR$(17)THEN IF POS(Ø)<39
    THEN 21Ø'IOFI
260 IF A$=CHR$(145)THEN IF POS(Ø)>39
    THEN 21Ø'IPXK
270 IF A$<>CHR$(133)THEN 15Ø'FKNI
280 REM *********************'BVBI
290 REM     REWRITE BLOCK'BMCJ
300 REM *********************'BVBB
310 OPEN 6,3,6'BFYY
320 PRINT#15,"B-P";2;177
    :POKE 211,Ø'CPSD
330 FOR I=Ø TO 78:GET#6,A$:PRINT#2,A$;
    :NEXT'GRQH
340 PRINT#15,"U2";2;Ø;18;Ø:CLOSE 6
    :CLOSE 2:CLOSE 15:END'FUAI
```

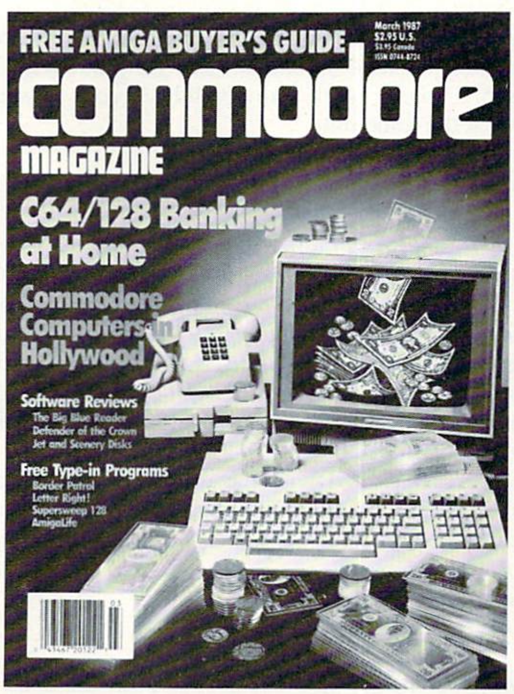
END

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Tips & Tricks

Continued from pg. 14

```
     128
134 DATA 072,114,064,063,242,032,007,
     254
135 DATA 032,000,255,192,000,031,128,
     000
136 DATA 010,000,000,018,064,000,063,
     192                            END
```

Acrojet: Full flaps (40 degrees) will give you a 100 mile per hour increase in top speed. When flying inverted at low altitude, you will crash unless you retract the flaps. Also, if you turn around and take off heading south, then turn back north, you'll be moving at over 300 miles per hour when you cross the start line. Use full flaps for this short field takeoff and get the gear up as soon as you are airborne.

One more quirk—take off heading north and fly toward the largest mountain. After several minutes you'll be in for a very wild ride!
Kevin J. Fitz-Gerald
Millersville, Pennsylvania

The Bard's Tale II: The code for the Dream Spell is ZZGO. The spell will transport your party to the entry square of one of the seven dungeons in the kingdom, bypassing any passwords or keys you may have otherwise required. Type in the appropriate number to enter these dungeons.

1—The Tombs
2—Fanskar's Fortress
3—Dargoth's Tower
4—Maze of Dread
5—Oscon's Fortress
6—The Grey Crypt
7—The Destiny Stone

Marie McElroy
Santa Ana, California

The Bard's Tale II: When in Garth's Equipment Shop, remove *The Bard's Tale II* character disk and insert *The Bard's Tale I* character disk. Then buy an item, and note the very special prices. You can even buy all the segments of the Destiny Wand for $50,000 a segment.
Warning: If you go backward when looking at the list, a jumble of weird characters will appear.
Stuart Webb
Yucaipa, California

Beach Head: For monster scores, save your firepower for when the reconnaissance plane gets to the middle of the screen. Keep your finger on the fire button and pump shells into the ball of flame. You'll score 2,000 points a hit until the fireball disappears. On the third screen, the difference between the angles of elevation is constant. After sinking the carrier, the angles left and right are +16, +8, +22, -28.
Steve Rohatynsky
Manitoba, Canada

Booty: Hold down keys *K-E-V-I-N* and you can see all of the game screens.
Edward Teach
Okracoke Inlet, North Carolina

Bop'n Wrestle: Run to the far right corner of the ring and turn to face your opponent. As soon as he approaches you, kick him in the stomach until his energy is depleted. Then grab him and perform the awful pile driver. He should be dead now, so jump on him for the count of three. Lord Toff, the champion, might need a little more punishment than the less exalted wrestlers.
P. N. Geek
Madison Square Garden, New York

Bruce Lee: Make sure you get all the lamps, because it helps in the end and you can get some pretty high scores. When you're trapped in the corner and the Sumo is charging you, drop straight to the ground and he can't hurt you.
Steve Rohatynsky
Manitoba, Canada

Championship Load Runner: This is for those frustrated players who can't get past level 2. Using a track and sector editor, examine track 12 sector 11. You'll see the eight-byte names of the levels, followed by seven other bytes. These seven bytes are the level printed on the screen, the level to be loaded, the number of men, and four bytes for the score.

You can use your editor to change the level printed to the screen and the level to be loaded (screen level number minus 1). For a bigger thrill, change the number of men. FF hex (255 decimal) is the maximum you are allowed.

As always when using a track and sector editor, a mistake can mean disaster. Be sure you know what you're doing before you edit anything on a valuable disk.
Phil Moores
Chester, Connecticut

Elite: If pirate ships attack you and fire a missile, respond by targeting a missile on one of them. All pirate ships have ECM systems, so one of the group will ECM your missile and their own at the same time.
Jean Laffite
Barataria, Louisiana

F-15 Strike Eagle: When flying an especially long mission, it's easy to run out of fuel within a few minutes of returning to base. One time when returning from a night mission over Hanoi, I started to run out of fuel four map grids away from base. Out of frustration, I started tapping rapidly on the 9 key (100% thrust). I ran out of fuel, but maintained thrust and was able to climb all the way to max altitude, from which I glided to a successful landing.

Later on I learned that while using this trick, you cannot arm or fire weapons or change radar range, although you can still maneuver.
Robert J. Oxley
Marine Corps Air Station
El Toro, California

Goonies: To get past screen one, push the chair under the ladder and stand on it to reach the ladder. Then have one Goonie operate the printing press while the other knocks over the water cooler and goes down through the trap door. Then rush the other Goonie down to the bottom as quickly as possible.

On screen two, you can get past the huge stones by pressing yourself against them when they are all the way down. Keep pressing against the stone while it moves up. When it gets high

enough, you'll be able to go underneath it with plenty of time before it falls.

On screen three, always know where the sniper is if one of your Goonies is out in the open. A Goonie can avoid the sniper by hiding next to a wall on the third or bottom tier.

To get past screen four, have one Goonie hang from the first chain and the other from the third chain. When the cannonball falls through the first hole, rush the upper Goonie down to the second tier and jump up to grab that chain. At the same time, move the first Goonie into position at the right base of the mound in the center of the bottom tier. When your Goonie is in position, let the ball drop through the middle hole. Then place your Goonies into the right position and repeat this process two more times. Be sure to watch the hammer at the lower right-hand corner of the screen. If it's about to strike the bell, place your Goonies in the upper right-hand corner or on the second tier at the point all the way to the left. These are the safe places to hide from bats.
Patrick McNair
Address Unknown

H.E.R.O.: In areas where you might have to retreat, using your laser beam to blast through walls is much safer than using dynamite. You should also slow down before descending. To avoid breaking lights, keep to the left of wide downward passages.
Patrick McNair
Address Unknown

ICUPS: Load ICUPS, reset the 64, then make these pokes in direct mode:

```
POKE 3214,234
POKE 3215,169
POKE 3216,0
```

They will stop alien fire from killing you on the scrolling game.

These will keep your energy from depleting when you touch the aliens:

```
POKE 45826,234
POKE 45827,169
POKE 45828,0
```

To restart the game, type SYS 2080 and press RETURN.
David Metzke
Victoria, Australia

Miner 2049'er: You can change levels very easily if you keep the fire button depressed for about seven seconds at the beginning of the screen.
Hernan Popper
Buenos Aires, Argentina
(Translated by Luz Amortegui, Pittsburgh, Pennsylvania)

Popeye: If you're having trouble getting off the board in which you catch the hearts, here's your answer: When the screen starts to go, punch the spinach when it is on the second layer, then chase Bluto to the right. When you punch him, he will fly around the room, and you must go quickly to the punching bag. When Bluto is directly beneath the bucket, punch the bag. Bluto will be stuck for the rest of the board, and will be unable to hurt you in any way.

The trick works on any level.
Robbie Stanford
Corinth, Mississippi

Raid Over Moscow: If it looks like you're about to crash in the hanger, tap the spacebar to get you out of there. Press it again for another try on getting your fighter out.
Steve Robatynsky
Manitoba, Canada

Rambo: While heading back home in your helicopter, you can get some extra speed by pressing CRSR DN and RETURN while pushing up on the joystick.
David Metzke
Victoria, Australia

Spy vs. Spy: Go to the room with the airport door and booby trap all the doors. The computer spy won't come here until he has collected all the objects. When he finally comes, he gets killed. This allows you to go back into the room, get the briefcase, and leave by the airport door.
Mata Hari Leuuwarden,
The Netherlands

Summer Games I: In diving, push the joystick to the right before jumping. Halfway to the water, push it down, left, then up as fast as you can. This will give you a higher difficulty factor and automatically improve your score. On forward and backward dives, hold the joystick to the right before jumping and push up to come out of your dive when you reach the judges. On reverse dives, come out of your position just before entering the water.

In gymnastics, you can get the highest possible score if you press the button to jump, then hold your joystick forward to come off the mat sideways. When your gymnast is in the vertical upside-down position over the horse, press the button. This will give you enough speed to do at least two somersaults.
Patrick McNair
Address Unknown

Ultima III: This will help you create super characters. Using your favorite disk sector editor, read track 16 sector 12 of the scenario disk. This should display the names of your characters; if it doesn't, simultaneously press the shift and Commodore keys. Following each character's name is a series of @'s, then a G if he's good or a D if he's dead. After the G are some more text characters leading up to the next name. Change these to 9's, and the associated character will turn into a superman.

Be careful when using this trick, or any trick involving a sector editor. Sector editors change the information recorded on the disk itself, and if you make a mistake you could ruin your disk. So either be very careful and very sure of what you're doing, or work on a backup disk that you can afford to clobber.
Justin Oldham
Shenandoah, Iowa

Warhawk: For infinite energy, load the game, reset the 64, then enter the following:

```
POKE 27090,169
POKE 27091,0
POKE 27092,231
SYS 24604
```

Don't forget to press RETURN after each entry.
Andy Carlson
Marietta, Ohio

Winter Games: In figure skating, keep facing left and falling over to get a maximum score of 6.0 when time is up. Tain't

pretty, but it works!
Alex Chaniotis
APO Miami, Florida

Zaxxon: Type RED at the title screen and you'll be immune to destruction. You may have to try it a few time until it takes. When you've succeeded, you'll see the word RED colored red just above the *Zaxxon* logo and just below your previous score. Once that happens, just start and play the game in the usual manner.

For an interesting game, go to the lowest altitude and fire at the wall. Your missiles will explode, but you'll sail right through the wall, able to blast anything you want.
Dan Clarke Rochester,
New Hampshire

Alphabet Training: This simple program adds fun and animation to the task of learning the alphabet. As each letter appears on the screen, the learner is required to search the keyboard for the letter matching the display. Pressing the correct key brings down the next letter in the alphabet.

Echoing the display from the keyboard should act to reinforce the learner's memory as well as physically involving him or her in the process.

If you simultaneously press the shift and Commodore keys, the display will change to lower case. The keyboard, of course, remains in upper case. An advanced alphabet learner can develop knowledge of the two versions of each letter.
R. S. Stokan
Chicago Heights, Illinois

```
10 PRINT"[CLEAR,SPACE4]
   ALPHABET TRAINER - R. S. STOKAN
   [YELLOW]"
20 FOR A=65 TO 90
30 GOSUB 100
40 GET A$:IF A$<>CHR$(A)THEN 40
50 NEXT A
60 PRINT"[HOME]":FOR J=1 TO 12:PRINT
   :NEXT
70 PRINT TAB(7);:FOR A=65 TO 90
   :PRINT CHR$(A);:NEXT
80 PRINT"[L. BLUE,DOWN8]"
90 END
100 PRINT"[HOME]":FOR J=1 TO 12
110 PRINT TAB(20);CHR$(A);"[UP]"
120 PRINT TAB(20);" ":NEXT
130 PRINT TAB(20);CHR$(A)
140 RETURN
```
END

Machine Language: The 128's built-in machine-language monitor includes a very simple assembler, as do most of the monitors for the 64 and other computers. The assembler lets you type the mnemonic for an instruction, then it converts that mnemonic to the numbers that are actually poked into memory.

While every real assembler makes it easy to insert instructions between already existing ones, these simple implementations lack that very important feature. So when you use them to change a program, you usually have to retype every byte that follows the change. If you make many changes at all, all those retypings can get tiresome pretty quickly.

Well, I use the monitor's T command to get away from retyping. This command copies a block of memory to any other location, leaving the original block unchanged. So when I write a piece of machine code, I always T it to another area in memory. Once it's there, I can change the original code to my heart's content; if the changes consist of insertions, I type them into the original code, then re-T the remainder from its temporary location back to the end of the insertions. I may have to clean up some relative branches, but that's usually a lot easier than retyping all the rest of the program.

In addition to easy insertions, the T procedure lets me easily restore the program to its original state, just by re-T-ing the entire block of code. That's useful when my changes are for the worse rather than the better, which happens more often than I like.
Robert J. Tiess
Middletown, New York

Troubleshooting Joysticks: If your joystick seems to be bad, it may be that something else is really the problem. Here are several steps you can take to narrow it down to the joystick.

First, be sure the joystick is in the proper port. Some programs require it to be in port 1, while others look for it in port 2. Second, try another joystick. If it doesn't work, then the first joystick is probably okay. In this case, you may have blown the joystick chip. And third, try the joystick with another program; maybe your software is at fault, and not the joystick.

Once you know your joystick is really bad, you might try taking it apart. Most joysticks are simple mechanisms, and if you're careful, you can disassemble them quite easily. Once you can see inside, look closely for loose wires or broken connections. If you find them, you can often fix them without even using tools.
John Kuhne
Ontario, Canada

Multiple printers: In many cases, it's possible to connect more than one printer to your Commodore computer. All that's required is that the printers have different device numbers.

The much-neglected 1520 Printer-Plotter, for example, is configured as device #6. As long as you have an extra serial port available, you can connect the 1520 at the same time as your regular printer. Commodore's DPS-1101 can be set up as any device between #4 and #11, and the MPS-801 can become #4 or #5, depending on the setting of a back-panel switch.

To print to a device other than #4, just OPEN a channel to it, then print to that channel. For example, OPEN 5,5 : PRINT#5,"HELLO" will print the word HELLO to whichever printer has device #5. The second 5 in the OPEN statement is the number that controls the device. The first 5 is just the file number, which you can select at will. The file number, of course, is used as the argument in the PRINT# or CMD statement. To illustrate, here's an alternate way of printing to device #5: OPEN 4,5 : PRINT#4,"GOODBYE".

Many printers and disk drives have, as you may have noticed, two serial ports. That's so you can connect many different devices to your serial bus. If you have the right sort of printers, those many devices can include more than one of them.
Thomas Wilkins
Franklinton, North Carolina

Continued on pg. 128

BY BRUCE JAEGER

String Magician

for the Commodore 128



ED SAUK

Here are handy string conversion routines for the 128 at machine-language speed.

Many programs require that the contents of a character string be altered in some way. Sometimes you may need to convert a string of text to true ASCII (as opposed to Commodore's non-standard PETASCII) before sending to a modem or a non-Commodore printer. Or you may wish to change all the commas and colons in a string to other characters so you can print them to a disk file and retrieve them without having to worry about the INPUT# statement refusing to bring in characters past a comma or colon. Or you may wish to encode a line before saving it to disk or sending it with a modem to a BBS. String Magician does this, in addition to counting the number of occurrences of a character in a string or converting all of the characters in a string to upper or lower case.

All of these functions could easily be implemented in BASIC using the MID$ command, but we'd be stuck with BASIC's usual penalty—lack of speed. String Magician uses the 128's POINTER command to find the actual location in bank 1 memory of the string being modified, then uses fast machine-language subroutines to do the character-by-character conversions.

It's easy to use String Magician in your own 128 programs. A simple setup subroutine (lines 880-940 in the demonstration program) uses the POINTER command to find the location of the string. The demo uses A$; you may use any string name you like. The setup routine then pokes the length of A$ into $FD (253 decimal), and the low-byte high-byte address of A$ into $FC and $FD (251-252). All the other information String Magician needs to know will be passed along when we make the SYS call to the machine language.

Here's how to use all seven of String Magician's functions.

Job 0: Convert from ASCII to PETASCII

This function converts a string from straight ASCII to the modified form Commodore computers use. If you've ever downloaded a BASIC program in ASCII format from a bulletin board service, this could come in handy! To convert a string from ASCII to PETASCII, simply GOSUB the setup subroutine, then include the line BANK 1 : SYS (64512),0 in your program. (The machine-language routine is located at $FC00 (64512 decimal), and the ,0 tells String Magician to perform Job 0.)

Job 1: Convert from PETASCII to ASCII

This is the complement to Job 0 which is probably more useful. With it you can convert a string to ASCII, ready to send directly to a non-Commodore printer (without an interface that emulates a Commodore printer) or ready to transmit via modem to another computer. To use, again call the setup routine (this must be done for ALL uses of String Magician, then include BANK 1 : SYS(64512),1 in your program. Again, the ,1 tells the machine-language routine to perform Job 1.

Job 2: Make All Lower Case

If you ever do any sorting of names or other information, you'll find that having mixed upper- and lower-case letters can ruin the sorting. For example, most sorting routines will think that Jones should come before JOHNSON because ASC("o") returns a lower value than ASC("O"). You should convert all strings to either all upper- or all lower-case before sorting.

Adventure or Eliza-like games that search for keywords also get confused by mixed upper- and lower-case. "Grab Bird" does not mean the same thing to the computer as "GRAB BIRD" or "grab bird" unless you've planned for it in your programming. The easy way out is to convert all the characters to all upper- or all lower-case.

As you've probably guessed, you use Job 2 (lower-case) in your programs by calling the setup subroutine, then including BANK 1 : SYS(64512),2 in your program.

Job 3: Make All Upper Case

This is the complement to Job 2 and makes all the characters in a string upper case. BANK 1 : SYS(64512),3 calls it. (Remember the setup routine first!)

Job 4: Count a Selected Character

Sometimes it's handy to know how many times a certain character appears in a string. If your database program uses a / to separate different fields of information, you may want to be able to quickly determine how many / characters are in a string. Or you can count the number of spaces in a string, which will be roughly equal to the number of separate words.

This job is the only function of String Magician that returns a value to your program, so we need an extra command to read the character count. We also need to tell the machine-language routine what character to count. Don't worry, it's still easy, and no more pokes to remember. To count a character:

1. Call the setup subroutine.
2. Set C$ equal to your choice of character.
3. Use BANK 1 : SYS(64512), 4,ASC(C$) in your program.
4. Use RREG N in your program (see lines 510-580 in the demonstration program).

Again, note that the variables C$ and N can be any variable names you like. The RREG N command will set the variable N to the value in the accumulator purposely put there by the String Magician ma-

chine language (RREG A,B,C would set the variables A, B, and C equal to the values in the accumulator, the x-register, and the y-register of the 8502 chip). You don't need to know any machine language to use String Magician.

Job 5: Swap Two Characters

This function is called in a manner similar to the one above, except that there is no value returned that we have to be concerned with. As an example, let's change all [characters to ((some printers can't do the square brackets). Here's how.

1. Call the setup routine.
2. Set B$=CHR$(91) (the left-bracket character).
3. Set P$="(" (the left-parenthesis character).
4. Use BANK 1 : SYS(64512),5, ASC- (B$),ASC(P$).

The B$ and P$ can be any variable names you prefer. Note that in Step 2 the string variable B$ was set equal to CHR$(91). It would also have worked to set B$="[", similar to the way P$ was assigned in Step 3 (in Step 3, we also could have used P$=CHR$(40); 40 is the ASC() value of the left-parenthesis character). Use the CHR$() method especially when you're working with non-printing characters.

Using the above ASCII values of 91 and 40, we could also have called the machine-language routine in Step 4 with BANK 1 : SYS(64512),5,91,40.

Job 6: Encode a String

This function might be called more properly transpose a string, as the individual characters of the string are jumbled up so they're unreadable. This is known as a transposition cipher, as opposed to the more familiar substitution cipher in which different letters or other symbols are substituted for the individual letters in a message.

To encode a string, first pick a key number from 1 to 255. Then call the machine-language routine in the usual way.

1. Call the setup routine.
2. Use BANK 1 : SYS(64512),6,K in your program. The variable K should have been set to your key number.

The resulting text is certainly unreadable (see lines 690-760 of the demonstration program)! Also note that there's no rule that says you can't re-encode the already transposed string! You can do that as many times as you like—and with different key numbers, too (just keep track of how many times the string has been transposed, and what the key numbers were!).

Job 7: Decode a String

As expected, this function decodes strings transposed by the preceeding job. You call it in exactly the same way, merely substituting a 7 for the 6 in the SYS call.

1. Call the setup routine.
2. Use BANK 1 : SYS(64512),7,K in your program.

Note that if you're decoding a string that was transposed a number of times, you'll have to do everything in reverse to decode it. If the numbers 1, 2 and 3 were used as keys, you have to decode using the keys in the order 3, 2 and 1.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

String Magician

```
7 GOTO 1ØØ'BDAG
1Ø SCRATCH"STRING MAGICIAN"
   :DSAVE"STRING MAGICIAN":END'DCFI
2Ø :'ABHX
1ØØ REM START OF PROGRAM'BOBY
11Ø REM INITIALIZE'BKDY
12Ø POKE 57,Ø : POKE 58,252 : CLR
    : REM PROTECT ML FROM
    VARIABLES'EKKI
13Ø SCNCLR : COLOR Ø,1
    : COLOR 4,1'DIVC
14Ø GOSUB 97Ø : REM POKE IN ML'CMJD
15Ø YELLOW$=CHR$(158) :
    REVERSE$=CHR$(18)'EAVJ
16Ø LOWERCASE$=CHR$(14)
    : WHITE$=CHR$(5)'EYNJ
17Ø LIGHTBLUE$=CHR$(154)'CPOH
18Ø TEST$ = "[SHFT T]HIS IS A TEST.
    [SPACE2,SHFT I]T IS ONLY A
    TEST!"'BFNO
19Ø SM=DEC("FCØØ") : REM SYS
    ADDRESS'DPVL
2ØØ :'ABHV
21Ø SCNCLR : PRINT REVERSE$; WHITE$;
     LOWERCASE$; TEST$'CIAH
22Ø PRINT'BACX
23Ø :'ABHY
24Ø REM TEST JOB #1 (PETASCII TO
    ASCII)'BBWH
25Ø A$=TEST$'BHWD
26Ø GOSUB 88Ø : REM POKE IN A$
    INFO'CQBH
27Ø BANK 1 : SYS (SM),1'CJLG
28Ø PRINT LI$ RE$ "[SHFT J]OB 1--
    [SHFT P]ETASCII TO [SHFT A]
    SCII"'BGWN
29Ø PRINT YELLOW$;A$'BKGI
3ØØ :'ABHW
31Ø REM TEST JOB #Ø (ASCII TO
    PETASCII)'BBVF
32Ø GOSUB 88Ø : REM POKE IN A$
    INFO'CQBE
33Ø BANK 1 : SYS (SM),Ø'CJKD
34Ø PRINT LI$ RE$ "[SHFT J]OB Ø--
    [SHFT A]SCII TO [SHFT P]
    ETASCII"'BGVK
35Ø PRINT YELLOW$;A$'BKGF
36Ø :'ABHD
37Ø REM TEST JOB #2 (MAKE ALL
    LOWERCASE)'BCKL
38Ø A$=TEST$'BHWH
39Ø GOSUB 88Ø : REM POKE IN A$
    INFO'CQBL
4ØØ BANK 1 : SYS (SM),2'CJMB
41Ø PRINT LI$ RE$ "[SHFT J]OB 2--
    [SHFT M]AKE ALL [SHFT L]
    OWERCASE"'BGGJ
42Ø PRINT YELLOW$;A$'BKGD
43Ø :'ABHB
44Ø REM TEST JOB #3 (MAKE ALL
    UPPERCASE)'BCOJ
45Ø A$=TEST$'BHWF
46Ø GOSUB 88Ø : REM POKE IN A$
```

```
    INFO'CQBJ
470 BANK 1 : SYS (SM),3'CJNI
480 PRINT LI$ RE$ "[SHFT J]OB 3--
    [SHFT M]AKE ALL [SHFT U]
    PPERCASE"'BGKQ
490 PRINT YELLOW$;A$'BKGK
500 :'ABHY
510 REM TEST JOB #4 (COUNT A
    CHARACTER)'BBSH
520 A$=TEST$'BHWD
530 GOSUB 880 : REM POKE IN A$
    INFO'CQBH
540 BANK 1 : SYS (SM),4,ASC("S")
    :REM COUNT ALL LETTER S'EDMN
550 RREG N : REM N NOW HAS # OF S'S
    IN A$'CUNK
560 PRINT LI$ RE$ "[SHFT J]OB 4--
    [SHFT C]OUNT [SHFT C]HARACTER (
    [SHFT E]XAMPLE: S)"'BGVS
570 PRINT YELLOW$; "[SHFT T]
    HERE ARE"N"S'S IN:"'BJVN
580 PRINT A$'BCDH
590 :'ABHI
600 REM TEST JOB #5 (SWAP
    CHARACTERS)'BAJH
610 A$=TEST$'BHWD
620 GOSUB 880 : REM POKE IN A$
    INFO'CQBH
630 C1$=" " : REM FIRST CHARACTER'CSVJ
640 C2$="/" : REM CHARACTER TO SWAP
    FOR'CWYL
650 BANK 1 : SYS (SM),5,ASC(C1$),
    ASC(C2$) : REM REPLACE ALL C1$
    WITH C2$'FRDS
660 PRINT LI$ RE$ "[SHFT J]OB 5--
    [SHFT S]WAP [SHFT C]
    HARACTERS"'BGBP
670 PRINT YELLOW$;A$'BKGK
680 :'ABHI
690 REM TEST JOB #6 (ENCODE
    STRING)'BXQP
700 A$=TEST$'BHWD
710 PRINT'BACC
720 GOSUB 880 : REM POKE IN A$
    INFO'CQBI
730 K=240 : REM KEY CAN BE ANY NUMBER
    1-255'CCWM
740 BANK 1 : SYS (SM),6,K
    : REM TRANSPOSE A$ USING KEY
    K'DHVP
750 PRINT LI$ RE$ "[SHFT J]OB 6--
    [SHFT E]NCODE [SHFT S]TRING"'BGGO
760 PRINT YELLOW$;A$'BKGK
770 :'ABHI
780 REM TEST JOB #7 (DECODE
    STRING)'BXHP
790 PRINT'BACK
800 GOSUB 880 : REM POKE IN A$
    INFO'CQBH
810 K=240 : REM KEY CAN BE ANY NUMBER
    1-255'CCWL
820 BANK 1 : SYS (SM),7,K
    : REM DECODE A$ USING KEY K'DEUN
830 PRINT LI$ RE$ "[SHFT J]OB 7--
    [SHFT D]ECODE [SHFT S]TRING"'BGWN
840 PRINT YELLOW$;A$'BKGJ
850 END'BACH
860 :'ABHI
870 :'ABHJ
880 REM SETUP SUBROUTINE'BPWP
890 BANK 1 : REM VARIABLE BANK'CPQQ
900 PT=POINTER(A$) : REM FIND A$'DOAI
910 POKE DEC("FD"),PEEK(PT)
    : REM LEN OF A$'EPBK
920 POKE DEC("FB"),PEEK(PT+1)
    : REM LOBYTE'FPCM
930 POKE DEC("FC"),PEEK(PT+2)
    : REM HIBYTE'FPTN
940 RETURN'BAQH
950 :'ABHI
960 :'ABHJ
970 REM POKE IN MACHINE LANGUAGE'BVQQ
980 RESTORE 1030 : BANK 1'CHLN
990 FOR J = DEC("FC00") TO
    DEC("FD68")'FFCS
1000 READ A$ : POKE J,DEC(A$)'DJKV
1010 NEXT J : RETURN'CCWU
1020 :'ABHU
1030 DATA 8E,6B,FD,8C,6C,FD,AA,E0,06,
     D0,03'BHHD
1040 DATA 4C,BD,FC,E0,07,D0,03,4C,F0,
     FC,A0'BHPE
1050 DATA 00,8C,67,FD,B1,FB,E0,00,D0,
     03,4C'BHRF
1060 DATA 5D,FC,E0,01,D0,03,4C,71,FC,
     E0,02'BHPG
1070 DATA D0,03,4C,85,FC,E0,03,D0,03,
     4C,93'BHRH
1080 DATA FC,E0,04,D0,03,4C,A1,FC,E0,
     05,D0'BHBI
1090 DATA 03,4C,AF,FC,91,FB,A5,FD,F0,
     0D,C6'BHVJ
1100 DATA FD,E6,FB,A5,FB,D0,02,E6,FC,
     4C,1A'BHLB
1110 DATA FC,AD,67,FD,60,C9,41,90,0D,
     C9,5B'BHLC
1120 DATA B0,06,20,30,FD,4C,6E,FC,20,
     33,FD'BHVD
1130 DATA 4C,46,FC,C9,41,90,F9,C9,5B,
     90,06'BHWE
1140 DATA 20,2D,FD,4C,6E,FC,20,36,FD,
     4C,6E'BHTF
1150 DATA FC,C9,C1,90,E5,C9,DB,B0,E1,
     20,2D'BHNG
1160 DATA FD,4C,6E,FC,C9,41,90,D7,C9,
     5A,B0'BHEH
1170 DATA D3,20,30,FD,4C,6E,FC,CD,6B,
     FD,F0'BHWI
1180 DATA 03,4C,46,FC,EE,67,FD,4C,46,
     FC,CD'BHVJ
1190 DATA 6B,FD,F0,03,4C,46,FC,AD,6C,
     FD,4C'BHBK
1200 DATA 46,FC,A0,00,AD,6B,FD,09,01,
     8D,6D'BHTC
1210 DATA FD,8C,6A,FD,20,44,FD,AE,6D,
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Continued on pg. 102

BY JOHN IOVINE

Interfacing Commodore's User Port, *Part 4*

This month we build a digital audio recording and playback unit for the Commodore 64 and 128 and convert the 128 into a digital oscilloscope.

Last month we gave the computer the ability to sense the environment by interfacing numerous transducers to the user port. The analog information from the transducer was first converted to its binary equivalent then transmitted serially into the computer's user port. This month we will do just the opposite—we will take binary information from the computer and reconvert it to an analog equivalent.

You may wonder what good such a procedure is. Well, have you ever thought of the technology behind NASA's triumphant photographs of Mars, Saturn and Jupiter? The procedure used to obtain those pictures is similar to what we are doing this month. Aboard the NASA space probes, the image information is read from the on-board camera, pixel by pixel. Each pixel is converted into binary information. This binary information is transmitted via radio to earth. Earthbound receivers receive and store the information. The information is then reconverted from binary back to its analog equivalent pixel image. The pixels are then reconstructed to form the picture. Instead of using video information, however, we will use sound.

The project we'll construct to demonstrate our digital to analog (DAC or D/A) conversion is a digital audio recording and playback unit. The procedure is similar to the one described for NASA picture taking. First, our sound information is converted to its binary equivalent. This information is stored in our computer's memory. After the sound is completely recorded, we then reconvert the binary information back to its analog equivalent sound.

Applications

At this point, you may say "so what! I could accomplish the same thing with a $10 tape recorder without going through all this analog to binary—binary back to analog jazz." What makes this technique unique is our ability to manipulate the binary information before we play it back. By doing so, we can get various special effects like echo, reverb repeat, frequency and timing changes. These digital effects are being used by many rock and roll artists.

On the scientific end, you could work on algorithms for speech recognition by computers. Or you may want to add a human voice to some of your programs. A voice in tutorial programs for foreign language or for educating preschoolers is opening new doors for entrepreneurs.

The advantage this has over our speech synthesizer (Part 2) is a higher quality of sound. When teaching a foreign language, inflection and subtle pronunciation becomes very important. The disadvantage, however, is the tremendous amount of memory required.

Sound Sampling

To understand how we measure the sound sample to obtain its binary equivalent, look at Figure 1. This presents the waveform of a typical voice trace as would appear on an oscilloscope. Figure 2 shows a magnified section of the same waveform. On the left-hand side of Figure 2 vertical axis (Y-axis), notice the volts level and the binary equivalent of those voltage levels. On the horizontal axis (X-axis), each division represents one sampling cycle.

When we are recording, our serial A/D chip reads the voltage of the waveform at that particular instant and transmits the binary number to the computer. The computer stores this number in memory and returns to the chip to get the next number. When it receives the next number, it stores that number in the next memory location. This continues for as long as we are recording. As you can see, it is following and recording the basic shape of the original waveform into memory.

When we play back, the computer reads the first binary number in memory and pokes it into the user port. Our second chip, the DAC 0808, picks up the number at the user port and outputs the analog equivalent voltage. The computer then retreives the next number and goes through the same procedure until it is finished playing back the sample. Examine Figure 3. Notice that the chip will be outputting a close approximation of the original waveform.

Sampling cycle time is very important. It determines the fidelity and maximum frequency the computer can record. For the 64 and 128 (in slow mode), we will be sampling at approximately 5,000 samples a second. The 128 will sample at 10,000 samples a second in fast mode. We use one byte of memory for each sample we store, so we will use up our available memory pretty fast. You have about 10 seconds of record time at 5,000 rate and 5 seconds at 10,000.

At 5,000 samples a second, the computer can record a maximum frequency of approximately 2,500 Hz. This is easy to see by looking at Figure 3 again. If our waveform jumped up and down between our sample points, the computer would not see it. It follows then at 10,000 samples a second that we can record a maximum frequency of approximately 5,000 Hz.

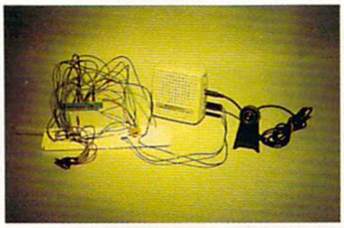
The slower rate is adequate for recording voice. At the higher rate, we can observe an interesting phenomenon called polyphonics. What this means is that the sampling rate is high enough to record more than a single sound. As is the case with music, both voice and instruments are recordable and played back. You can experiment with polyphonics with the 128 in fast mode.

Digital Oscilloscope

After we have accomplished sound recording and playback, we will go a little further and display our sound sample information by converting the 128 into a digital oscilloscope.

By loading a small program after we're done recording, we can create a digital oscilloscope using the 128 graphic screen. We can use the scope to analyze our voice or music prints that we have placed in the computer memory. And as long as you stay within the input voltage requirements of our serial A/D chip (0 to +5V), you can perform a waveform analysis of any signal you'd like.

It is interesting to note that the image formed on-screen is an exact real-time rendition of Figures 2 and 3. Our scope shows 320 sample cycles per screen. That's equal to about .064 seconds of sound in the slow mode and about .032 seconds of sound in the fast mode. The program will continue displaying the entire waveform by automatically clearing the screen and plotting the next 320 points in memory.



Circuit Description

The circuit is simple and straightforward. Most of the components are plugged into our breadboard. We will again utilize our serial analog to digital chip from last month to input the audio information into the computer memory. You can use audio information from any source you like, such as radio or tape deck. This article, however, will detail using a standard microphone to record one's own voice.

The second chip in this project is the DAC 0808. This is the digital to analog chip. By outputting binary numbers on the eight user port pins (PB0 to PB7), this chip reads the binary number and outputs the equivalent analog voltage. This voltage is fed into the audio in pin of the composite video connector and will, therefore, play through your monitor or TV speaker. This simplifies the circuit by requiring us to use only one amplifier at the input stage. (You can connect an amplifier instead to the output wire and a ground wire and playback through it rather than the monitor.)

Rather than have you build an audio amplifier from scratch for the microphone on the input stage of the project, I decided that it would be more conducive for the project to purchase a small battery-powered amplifier complete from Radio Shack. The amplifier cost is $11.95, which brings the total for this project to approximately $20 (this does not include the serial analog to digital chip that is assumed to have been purchased last month). This allows us to concentrate on the main chips and stay within the theme of what we are to accomplish without being unnecessarily complex.

The microphone plugs into the input jack of the amplifier. A similar plug (see parts list) that we solder two wires to plugs into the external speaker jack on the amp. These output wires from the amp go to the input of our serial A/D chip.

Although this project is inexpensive to build, it is not short on performance. I'm sure you will be quite surprised by the accuracy and fidelity of the reproduction. It competes with the new Apple II GS Ensoniq sound chip in sound sampling capability.

Programs

First, let me apologize to the VIC 20 users. Because of the high sample rate required, it is not practical to attempt this project. Therefore, I didn't write any programs for it.

Type in and save the BASIC loader for your particular computer. This is necessary as the BASIC loader erases itself after it's run. Then type in and save the BASIC controller; if you have the 128 computer, also save the Digital Scope program.

Load and run the Loader program, then load and run the Control program. Turn on the amp, volume to full, then SYS the number in program to record. To play back, SYS the number in program. On playback, if there is a lot of static it is due to over-modulation. Turn down the volume on the amp or hold the microphone further away from your mouth. Keep varying the volume control until you get a perfect recording. Once you find the right setting, it's really easy to get good recordings. If you're operating the 128 computer, you can go into the fast mode at this point and notice the better fidelity.

If you like, try recording music to hear polyphonic sound. Vary between the slow and fast modes and you'll see how important sampling time cycles are. Remember, if you're recording music through the mike, that in itself will add some static and distortion. If you should make a direct connection, watch those voltages.

For the 128 users, after you have a good sound sample in memory, load and run the Digital Scope program. You may have to sit through a few screens before you start to see some activity. That depends on how long it took you to speak after you SYS to record. Remember, you have over 40K of memory to look at; each screen holds only 320 bytes of information.

I would also advise to record at the 10,000 sample rate. This keeps the waveform more concise when plotting. If you want to do waveform analysis with the digital oscilloscope, tie in your signal to the input of the serial chip and record. And again, watch the voltage.

The Digital Scope program, as it stands, plots points. When doing waveform analysis of complex waves, the dots break up into a disconnect pattern. To alleviate this problem, change lines 50 and 60 and add line 55 as follows:

```
50 bank 0:h=(peek(ba+g)+05)
55 h1=(peek(ba+g+1)+05)
60 bank 1:draw ,g,h to g+1,h1
```

This change allows the program to draw lines connecting the dots and will help a great deal when studying waveforms.

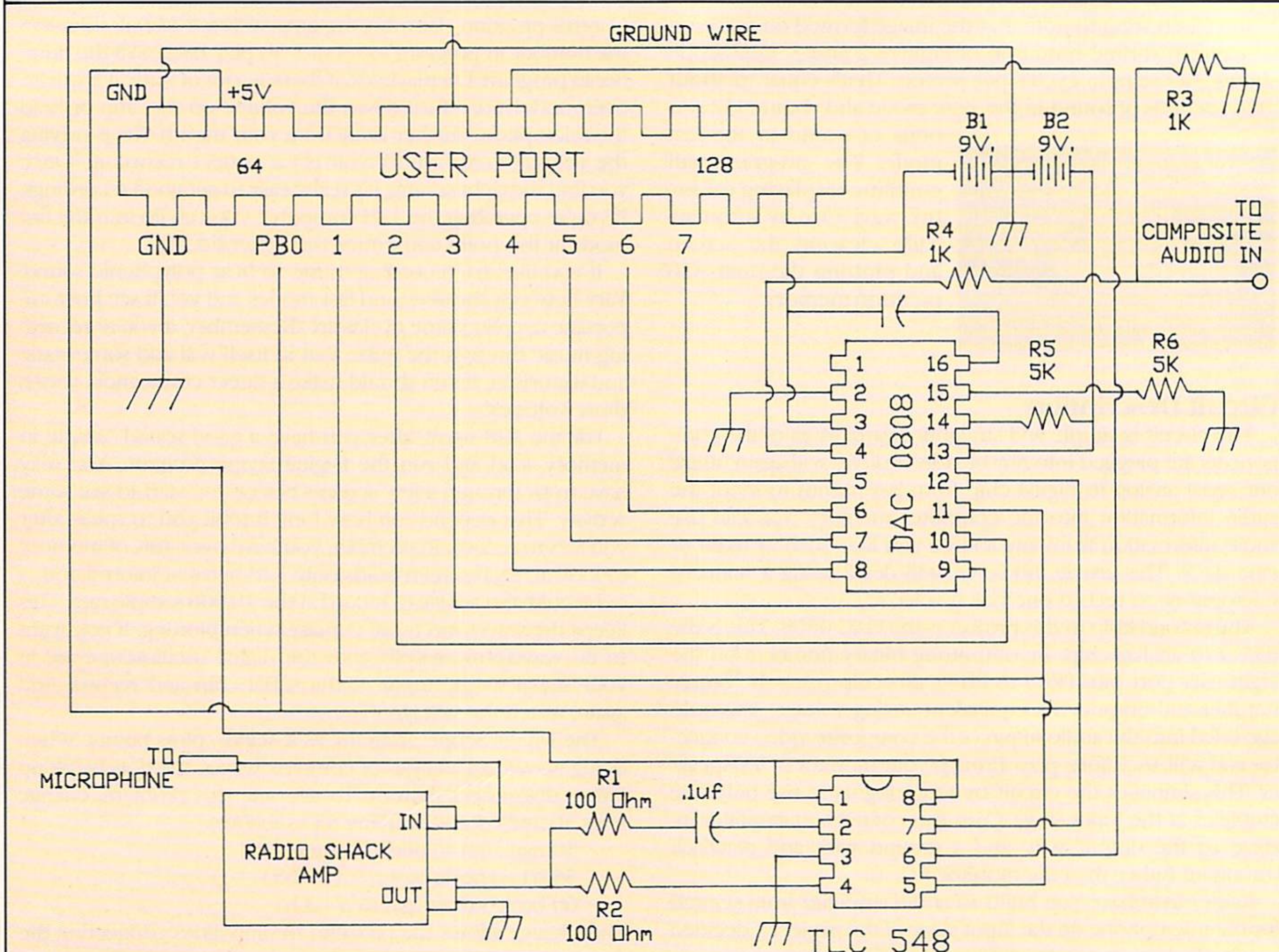
It should be obvious that there is a lot more you can do with this project: digital special effects, waveform analysis, loading and saving the binary sound information on disk to be used to put sound or words in your programs. You may be able to eliminate the DAC 0808 chip and utilize the SID chip inside the computer.

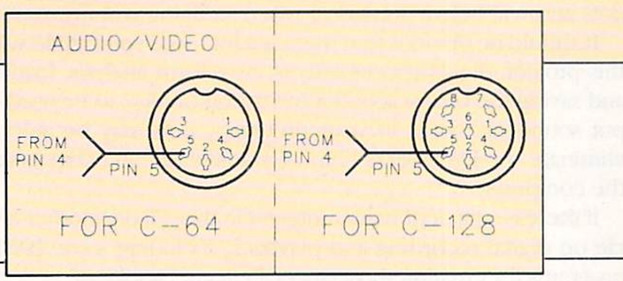
If there is sufficient reader interest in this, I'll do another article on digital recording and playback, including some BASIC programs for creating those special effects I spoke of. ■

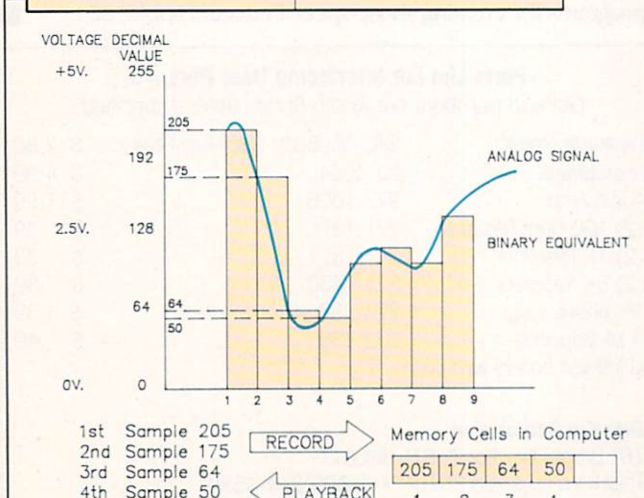
Parts List For Interfacing User Port #5
(All part numbers are Radio Shack unless specified)

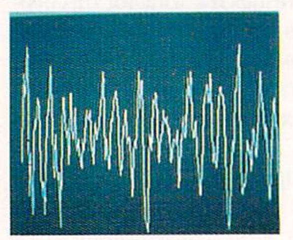
Digital-Analog IC	DAC 0808LCN (Digi-Key PN#)	$ 2.80
Microphone	33-1054	$ 4.99
Audio Amp	277-1008	$11.99
(2) 100 Ohm Resistors	271-1311	$ .39
(2) 1K Resistors	271-1321	$ .39
(2) 5K Resistors	271-1330	$ .39
1/8" phono plug	274-286	$ 1.39
.1 uF Capacitor	272-135	$ .49
(2) 9 volt battery with cap		

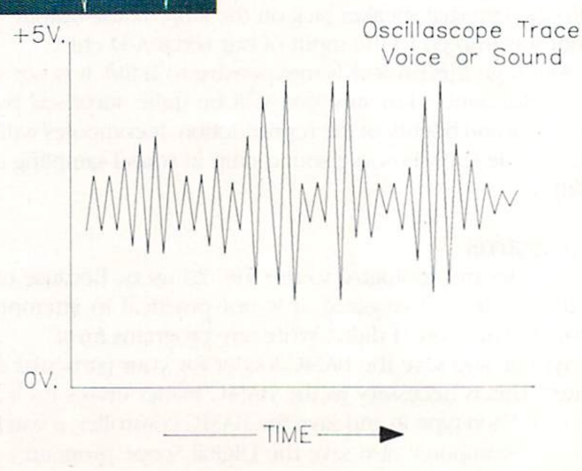
Digi-Key Corporation
701 Brooks Ave. South, P.O. Box 677
Thief River Falls, MN 56701 • 1-800-344-4539











Oscillascope Trace
Voice or Sound

INTERFACING COMMODORE'S USER PORT

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

128 Loader

```
20 FOR J=4864 TO 5ØØ2:READ X:POKE J,X
   :NEXT'GQYF
25 NEW'BALD
3Ø DATA 12Ø,16Ø,8,169,Ø,141,1,221,169,
   1,141'BKWG
4Ø DATA 1,221,136,192,Ø,2Ø8,241,173,
   13,221'BJAH
5Ø DATA 173,12,221,16Ø,2,14Ø,1,221,
   172,138'BJBH
6Ø DATA 19,141,1,255,145,253,169,Ø,
   141,Ø,255'BLJJ
7Ø DATA 2ØØ,14Ø,138,19,192,255,2Ø8,2Ø,
   16Ø'BISJ
72 DATA Ø,14Ø,138,19,23Ø,254,165,254,
   2Ø1'BHRL
74 DATA 244,2Ø8,7,169,66,133,254,88,
   96,234'BJWO
76 DATA 162,1,2Ø2,2Ø8,253,76,1,19,96,
   12Ø'BHUP
78 DATA 172,138,19,141,1,255,177,253,
   142,Ø'BJSS
8Ø DATA 255,141,1,221,2ØØ,14Ø,138,19,
   192,255'BLHL
82 DATA 2Ø8,19,16Ø,Ø,14Ø,138,19,23Ø,
   254,165'BKON
84 DATA 254,2Ø1,244,2Ø8,6,169,66,133,
   254'BHJO
86 DATA 88,96,162,33,2Ø2,2Ø8,253,76,
   79'BFBQ
88 DATA 19,96,255,Ø,255,Ø,255,Ø,255,Ø,
   Ø'BGPS
```

END

128 Control

```
5 GRAPHIC 1,1'BDHE
1Ø REM BASIC CONTROL1.Ø'BPKB
2Ø POKE 56579,255:POKE 253,ØØ
   :POKE 254,66:POKE 5ØØ2,Ø'EFSG
3Ø REM SYS 4864 TO RECORD'BPWD
4Ø REM SYS 4943 TO PLAY'BNIE
5Ø END'BACB
```

END

64 Loader

```
2Ø FOR J=4864 TO 4985:READ X:POKE J,X
   :NEXT'GQSF
25 NEW'BALD
3Ø DATA 12Ø,16Ø,8,169,Ø,141,1,221,169,
   1,141'BKWG
32 DATA 1,221,136,192,Ø,2Ø8,241,173,
   13'BFMH
34 DATA 221,173,12,221,16Ø,2,14Ø,1,
   221,172'BJTJ
36 DATA 122,19,145,253,2ØØ,14Ø,122,19,
   192'BIPL
38 DATA 255,2Ø8,22,16Ø,Ø,14Ø,122,19,
   23Ø,254'BKBO
4Ø DATA 165,254,2Ø1,148,2Ø8,9,169,2Ø,
   133,254'BLYH
42 DATA 88,96,234,234,234,162,2,2Ø2,
   2Ø8'BGII
44 DATA 253,76,1,19,96,12Ø,172,122,19,
   177'BIJK
46 DATA 253,141,1,221,2ØØ,14Ø,122,19,
   192,255'BLXN
48 DATA 2Ø8,22,16Ø,Ø,14Ø,122,19,23Ø,
   254,165'BKBP
5Ø DATA 254,2Ø1,148,2Ø8,9,169,2Ø,133,
   254'BHFH
52 DATA 88,96,234,234,234,162,33,2Ø2,
   2Ø8'BHKJ
54 DATA 253,76,73,19,96,234'BTPJ
```

END

64 Control

```
2Ø POKE 56579,255:POKE 253,ØØ
   :POKE 254,2Ø:POKE 4986,Ø'EFDG
3Ø REM SYS 4864 TO RECORD'BPWD
4Ø REM SYS 4937 TO PLAY'BNLE
5Ø END'BACB
```

END

Digital Scope

```
2Ø GRAPHIC 1,1'BDHY
3Ø BA=16896'BHQB
4Ø FOR G=1 TO 32Ø'DFCC
5Ø BANK Ø:H=(PEEK(BA+G)+9Ø)'FNDH
6Ø BANK 1:DRAW ,G,H'CHEF
7Ø NEXT'BAED
8Ø IF BA<62464 THEN BA=BA+32Ø'FOAK
85 IF BA=>62464 THEN END'FHHN
9Ø GRAPHIC 1,1:GOTO 4Ø'CGVH
```

END

Monster-Whompin', Map-Making, Evil Wizard Excitement

A Fantasy Role-Playing Roundup

By Shay Addams

How long has it been since you wandered into a dark room looking for an Evil Wizard, only to be attacked by 999 Berserkers and a half-dozen Blue Dragons? If the answer is "not lately," then you aren't playing enough fantasy role-playing games. Take a look at these games for the Commodore 64 and Amiga to see what you've been missing.

Fantasy role-playing games differ decisively from text and graphic adventures like *Zork* and *Oo-topos*. The main difference is that role-playing games give you more to do, for in addition to solving puzzles you'll wage a constant battle for survival: fighting monsters, marketing food, or haggling with merchants over the price of a new broadsword.

Strategy is more important because the typical role-playing game puts you in charge of a team of four to eight characters with varied capabilities. This means that you've got to think like a baseball coach to coax the best performance from each member. Learning how to cast magic spells effectively, figuring out a newly found object's purpose, earning money and mapping—lots of mapping!—these are just some of the diverse activities in store for would-be wizards and warriors. With so many kinds of actions available, role-playing games employ a keyboard or keyboard/joystick interface instead of a parser that enables the player to type commands in English.

While the roots of text and graphic adventures can be traced to a mainframe computer game, *Colossal Cave*, role-playing games owe their inspiration to a board game called Dungeons and Dragons™. In Dungeons and Dragons, each player assumes the role of a character whose capabilities are represented by attributes for things like strength, intelligence, dexterity, and whose health is measured in hit points. These can be improved by earning experience points through successful combat and other actions, and your character usually needs a certain number of points to advance to a higher level and qualify for learning new spells or gaining other advantages (character devel-


AMIGA

opment is one of the most rewarding aspects of role-playing games).

In the board game, one person, the gamemaster, invents the story—very often a variation on "find and slay the evil wizard"—and conveys it to the players, then rolls dice to determine the outcome of their actions and interactions. Computer role-playing games, however, are played solo instead of in a group, and the program moderates the action, rather than the gamemaster.

Until 1985, the *Ultima* and *Apshai* series were the only computer role-playing games available for Commodore gamers. Now more than two dozen new titles lurk in the shadows of the nearest software store, and some legendary games for other computers have finally been converted for Commodore machines. As a result, there are so many role-playing games that even hard-core dragonslayers can't keep track of them all. So whether you're new to the genre or a battle-scarred veteran, this update will simplify your quest for the best in fantasy role-playing games.

Adventurers Wanted: No Experience Necessary

It is important that you finish your first game. If you give up, then you'll probably never play another one and miss out on lots of fun. *Temple of Apshai* and *Wrath of Denethenor* are well-suited for beginners because they are one-character scenarios, so you don't have to keep track of a lot of statistics. In *Wrath of Denethenor,* for example, you have only two traits (strength and intelligence) to develop and two other factors (hit points and stamina) to maintain while on the trail of the evil wizard Denethenor. Your animated character is seen from a birds-eye view as he roams islands to find 11 magic spells that are vital to the quest.

Wrath of Denethenor's manual provides maps of each island, and the underground labyrinths are easy to map—these aspects will introduce first-timers to the art of mapmaking that is so important in adventuring. And a handy magic spell unfurls an onscreen map of the entire island, revealing details missing in the manual's map. There are no tricky puzzles to solve, just figuring out each spell's purpose and which objects are needed to cast it. Finding the spells is fairly easy, for you simply talk to clerics and other characters who live in the cities and villages in order to get clues.

Temple of Apshai is also recommended for similar reasons, but is a much older program that lacks the polished animation and special effects of *Wrath of Denethenor*. You get three games with *Temple of Apshai,* however, which will keep you entertained for a few months.

Ultima I is actually older than *Temple of Apshai*, but was upgraded and enhanced with features from the later *Ultimas* when it was converted to the Commodore 64 format early this year. Another one-character game, its quest to terminate the Evil Wizard Mondain is a more involved affair than the goal of *Wrath of Denethenor* or *Temple of Apshai*. You have to make more decisions when creating your character, such as choosing a race (elf, hobbit, dwarf) and class (fighter, magician, paladin). Most of the action occurs on a continent whose cities and terrain are shown from an aerial view, but the mazes are illustrated in a first-person, 3-D view that makes them harder to map. Of this trio, only *Ultima I* would be enjoyed by experienced role-playing fans, for it is the cornerstone of an ongoing epic whose latest installment, *Ultima V,* was still under development at the time of this writing.

Arcade gamers might prefer *Rings of Zilfin* for their first outing in a fantasy land, because it incorporates animated combat scenes into the story. For your first multiple-character game, *Shard of Spring* gives you a four-member team of spellcasters and swordswingers to send after the dastardly Lord Dragos. The spells are easy to master, the puzzles are relatively simple but quite logical, and the aerial view mazes are no problem to map. It's still no pushover, so experienced players may also enjoy *Shard of Spring*.

Adventurers Wanted: Experience Required

The going gets considerably tougher in these intermediate level games, where you'll face harder puzzles, master more complicated magic and combat systems, and devote extra time (and graph paper) to mapping. *Phantasie I* is built around a good set of puzzles whose clues lie hidden in nine dungeon mazes riddled with secret passages and monsters. It's a six-character game with a joystick-controlled menu interface that makes it effortless to play. The pictures and animation are below par, however, for they were programmed with low-resolution graphics.

A four-character scenario set, *Ultima III* is one of the classics. It is set in the land of Sosaria, where your target is Exodus, the vile spawn of Mondain and Minax. The magic system is inventive, and plenty of animated combat awaits the intrepid adventurer who enters this realm. The 3-D mazes are easier to map than most such labyrinths, thanks to a special spell that shows an aerial view of the entire maze so you can copy it from the screen. Tactics play an important role as you individually maneuver each crew member around a combat arena that fills the screen when they encounter monsters.

Ultima II is similar in many respects except there's no combat arena. Most players have found this one-character game harder than *Ultima III* because you have to unravel the convoluted secret of its time doors, which connect various lands at different periods of time, in order to reach the locations necessary to slay Minax the Enchantress, a student of Mondain's.

Xyphus will appeal to those with war gaming experience, for it considers factors such as the effects of traveling through different types of terrain. You can also move each of your four party members independently to different places on the aerial view map, a rarity in role-playing games (in most scenarios, the crew is depicted by a single icon on the main map and represented individually only in the combat phase). *Xyphus* recruits you to slay the Demon Lord Xyphus. It features four scenarios; after you complete one, the next loads automatically.

In *Phantasie II*, the original game's combat and magic system were put to work in a sequel with tougher puzzles and meaner monsters. Magic is emphasized more than in the original game. You can use characters developed in *Phantasie I*, but will probably have more luck with a freshly created crew. It also uses the same low-resolution graphics and easy-to-map mazes, but the end game is extremely difficult (look for *Phantasie III* by the end of the year).

If all these plots are beginning to sound the same—only the name of the Evil Wizard changes from game to game—then the plot of *Moebius*, in which you must track down a renegade monk and return a Mystic Orb, gives a fresh twist to the classic theme with a highly original game design. The aerial view of your character's surroundings—stone buildings and temples, bamboo jungles—

are illustrated with intricate detail. The magic system is equally original, with spells that call for ingredients such as panda fur, tiger's teeth, and other Oriental items that fit in with the game's theme. There are no mazes to get lost in, and a clever auto-mapping feature shows several views of the land you are currently exploring.

Your quest takes you through four realms—Earth, Water, Air and Fire—and each is a separate scenario that must be completed before moving on to the next. Entry to the next realm is attained only by using objects and magic to solve a logical puzzle. The combat phase is the most action-oriented ever seen in a role-playing game. Your fluidly-animated character faces an assassin or palace guards in a full-screen arena and fights (via keyboard commands) with sword or karate. Because of its original design and excellent implementation, *Moebius* is among my all-time favorites.

Only the Good Wizards Die Young: For Experts Only

If you have lots of time to devote to your fantasies, any of these games will keep you occupied for months. *Ultima IV* is commendable because it does *not* ask you to slay yet another Evil Wizard. Instead, the goal is to attain or develop virtues like honesty and courage and ultimately become an Avatar (but you do get to exterminate hordes of fiends in the process). Your band of adventurers will include up to eight characters, who will trek across one of the largest landscapes ever seen in a role-playing game.

As in all the *Ultimas*, you uncover clues by conversing with the people who live in the towns and villages. But the degree of interaction has been expanded to new heights, and a mini-parser enables you to carry on lengthier conversations than in other games. There are some serious 3-D mazes to map, and again a magic spell simplifies the process. The authentic magic system requires you to root out weird ingredients and combine them in the proper proportions before you can cast a spell, and the combat system uses the aerial view arena of previous *Ultimas*—but now you can flee the scene instead of having to fight to the death (in this respect it is easier than *Ultima III*).

Few role-playing games convey the authentic atmosphere of Dungeons and Dragons as well as *The Bard's Tale*. The first game in this series, in which you are out to rescue the town of Skara Brae from Mangar the Dark (you guessed it, an Evil Wizard) is exceptionally tough. Its 15 mazes, seen from a first-person view and filled with spinners, teleports, and deadly traps, make it hard to map—and even harder to survive long enough to draw the map.

The monsters or the maze appear in a window on the left, while the all-text combat report is scrolled up the right. Colorful spot animation enlivens the atmosphere, and the graphics really stand out in the Amiga version. A complex magic system requires you to develop three kinds of spellcasters, and a new character class, the Bard, casts spells by singing or playing one of six songs. Occasionally you have to type in some words found elsewhere in the game or answer a riddle in order to gain entrance to a new location. Warning—if you do not enjoy mapping intricate mazes on graph paper, you're better off with an *Ultima*; but if you have a tattoo on your left shoulder that says "Born to Map," then dive in.

The sequel to *The Bard's Tale, Destiny Knight,* embellishes the original game system in many ways, including 79 new magic spells and ranged combat, which necessitates more tactical decision-making.

Ranged combat means that some weapons, like spears, can hit monsters that are too far away to reach with a sword; this restriction also affects some of the spells. *Destiny Knight* also introduces snare rooms, locations in which you must solve a puzzle within the time limit or your entire party dies. Naturally, the seven fragments of the Destiny Wand, which you must retrieve before facing the Evil Wizard, Lagoth Zanta, are hidden in snare rooms, which themselves are concealed in the game's 25 mazes. Characters from *Ultima III* can be used in either of these programs, and your *The Bard's Tale* team may be imported to *Destiny Knight*.

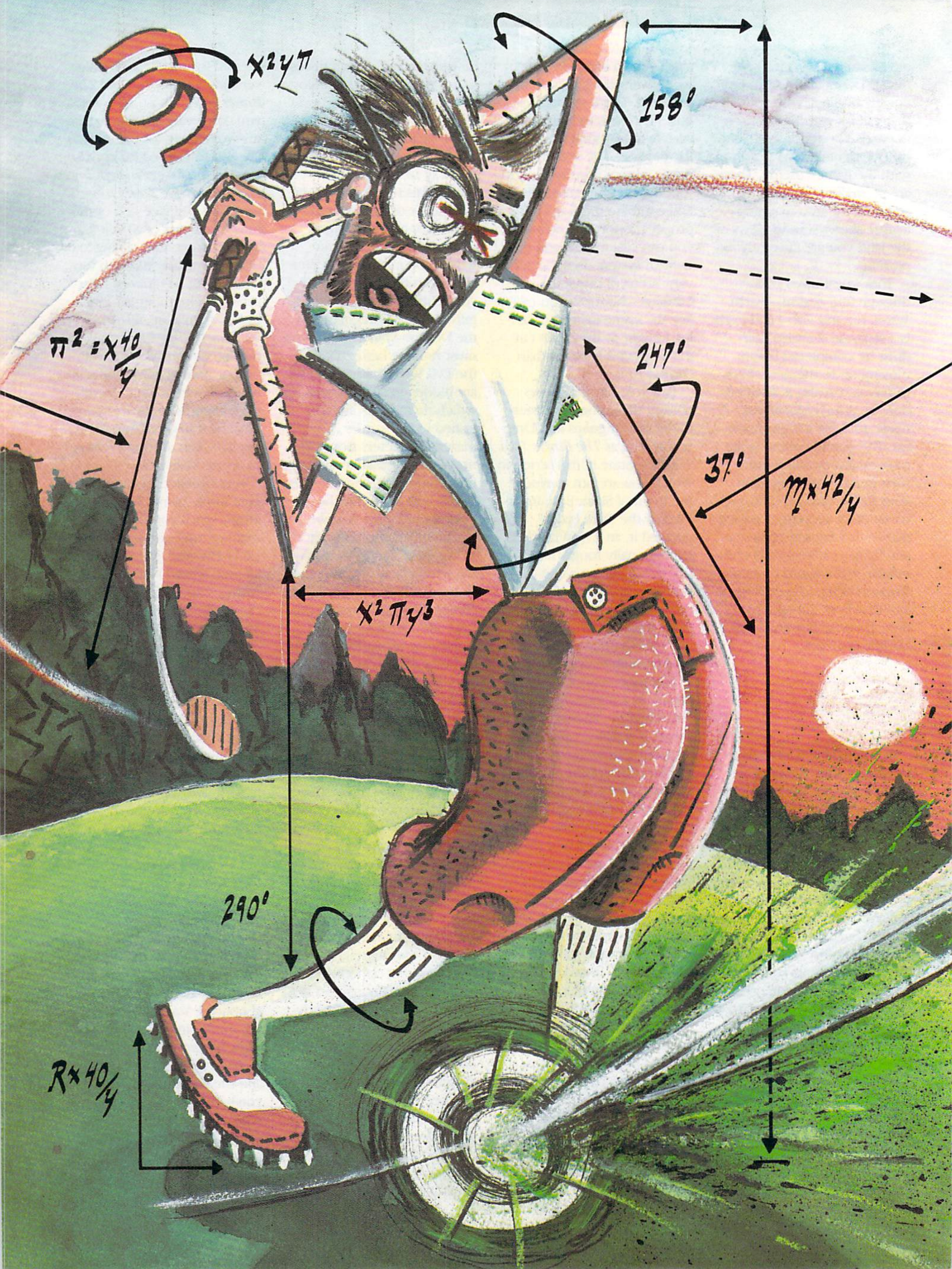
The most ambitious effort to combine fantasy role-playing with a tactical war game, *Wizard's Crown* puts you in charge of eight characters to lead on a quest for a magician's crown that must be returned to the Council of Wizards. The graphics are less than impressive as you map your way through a dozen aerial-view mazes, but some gamers like the way *Wizard's Crown* lets you customize a character's growth by spending experience points on the traits or skills you want to develop (in most games, the results of a character's advancement are predetermined). *Wizard's Crown* is tactics-intensive, in that you control the actions of each character in battle, and there are so many combat options that the program actually offers a help menu! Because of its overly complex interface, I can only recommend this one for dedicated war gamers who are curious about role-playing.

Since 1981, the most legendary role-playing game, *Wizardry,* has been available only for the Apple and IBM—but has finally been converted. Different graphics were created for the 64 and Amiga versions, and if you liked *The Bard's Tale*, this is one game you don't want to miss. In fact, it is five games, for the sequels are also scheduled for conversion. In the first one, *Proving Grounds of the Mad Overlord,* you will face one of the most malignant of all Evil Wizards, Werdna, after slicing and dicing your way through ten maddening 3-D mazes. Character development is more elaborate than in an *Ultima* or *The Bard's Tale,* for characters may be designated as good, evil, or neutral, which affects many elements of the game. Characters from the first game must be transfered into the sequels, which don't allow you to create fresh ones.

A conversion of a more recent Apple game, *Might and Magic* sends you on an assortment of mini-quests and missions. Fifty-five 3-D mazes (an all-time record) await your six warriors and wizards, who can avail themselves of an imaginative magic system. There are lots of special effects, but the most interesting aspect of this one is that you can often earn experience points for feats that don't involve killing monsters, usually the only way to do so. And as in *Ultima IV*, you don't have to seek and slay an Evil Wizard here, for the goal is to discover the secret of the Inner Sanctum.

As I wrapped up this story, the latest entry in the field was *Realms of Darkness*. With eight characters you must complete seven quests, each harder than the preceding one, that take place inside 30 mazes. It offers two unusual options. You can divide your party into as many as eight subgroups and send them to different locations, and the adventure mode lets you handle some situations by typing in commands as you would in a text or graphics game.

Continued on pg. 125


x²yπ
158°
π² = x 40/4
247°
37°
x² πy3
290°
Rx 40/4

BY JOHN JERMAINE

CARVER GANG: Still at Large

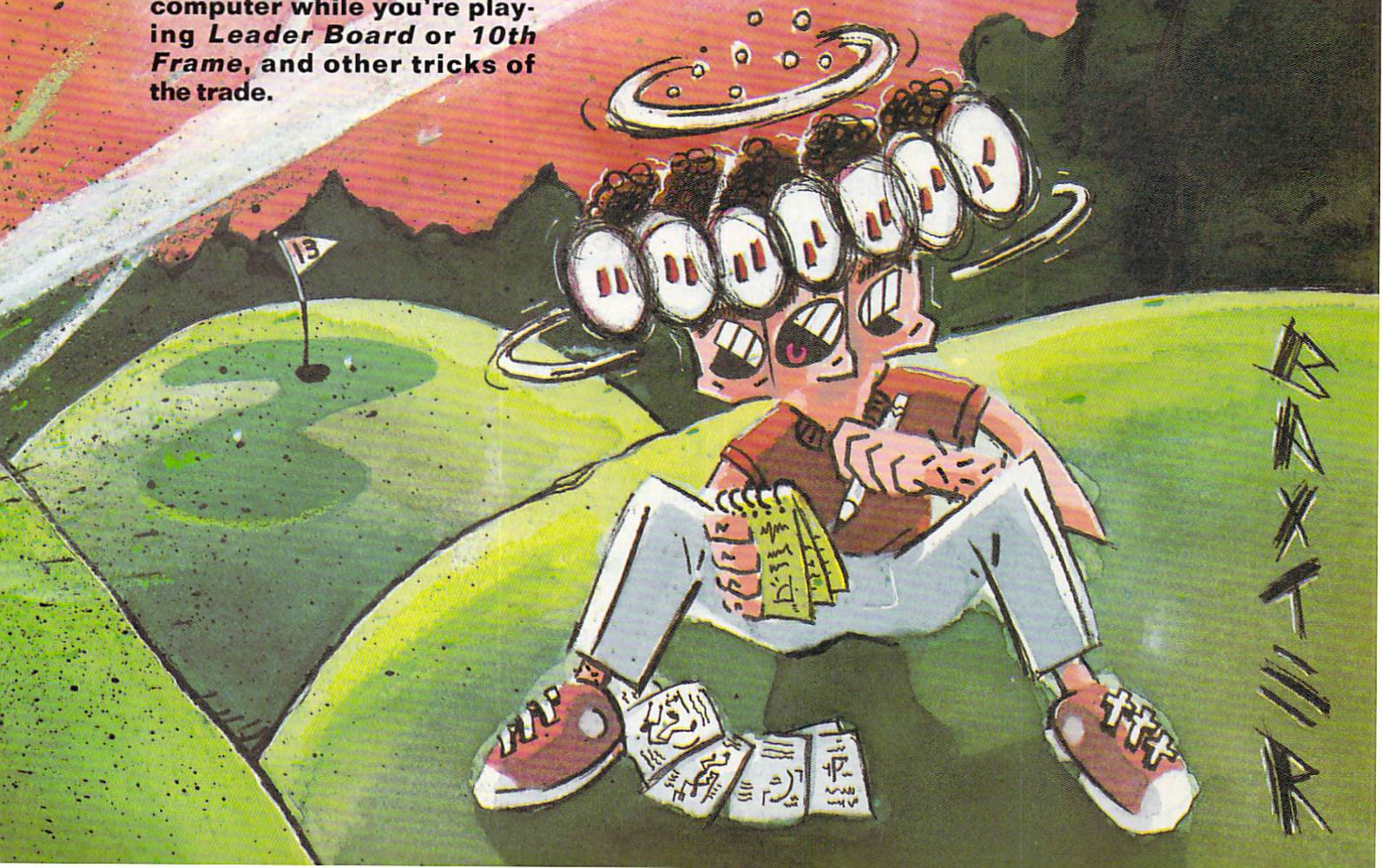
Part Two: Getting into Action Sports



In part one, we examined the origin of Access Software with Access' Bruce and Roger Carver, and discussed their software development through the completion of *Beach Head II.* In Part two, the Carvers explain how you take a video tape of a golfer or bowler and translate it into computer graphics, what actually goes on inside your computer while you're playing *Leader Board* or *10th Frame*, and other tricks of the trade.

Jermaine: Why was *Beach Head II* your last war game?

R. Carver: Our sales records indicate that *Beach Head* sold very well, but *Raid Over Moscow* sold fewer copies, and *Beach Head II* sold even fewer copies. The military game market was definitely on the decline, so we began searching for a software theme that had a larger



base of potential customers. Let's face it. We have to earn a living from our work, no matter how much we enjoy doing it.

Bruce and I decided to get into action sports for several reasons. First, sports games are traditionally popular in the United States and England. And second, as we developed *Beach Head II*, Bruce and I also discovered a new method of creating computer graphics. Before this we had tried several new techniques of animating computer figures, but we hadn't been able to achieve the smooth lifelike motion we were after. One day I found a reasonably-priced portable video machine and camera unit, which would display flicker-free still frames of video tape. I then began experimenting with still-frame pictures.

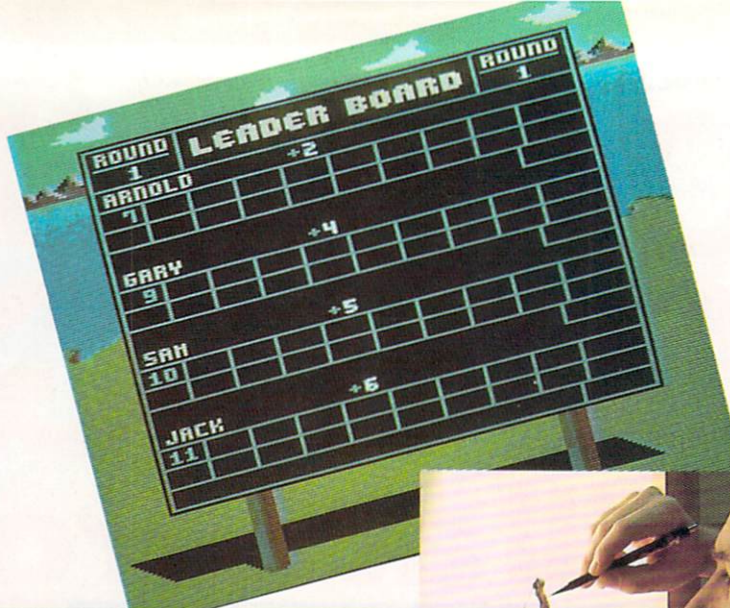
The result of this is the opening sequence of *Beach Head II* where you see the computer graphic translations of Bruce, Chris Jones and myself running from wall to wall, scaling walls and avoiding machine gun fire. We shot the video tape of our military maneuvers in a local park. However, we didn't parachute out of a plane and tape that experience for the game. Men running and climbing were the only graphics of *Beach Head II* that originated on video tape.

As we continued to refine our new graphic technology, we discovered that we could create a large human figure on the screen and give him the qualities of real human motion. Bruce and I had discussed the possibility of creating a new type of golf program for a long time, but the decision to make *Leader Board* would come at a later time.

Jermaine: How exactly does your graphics technique work?

B. Carver: I can illustrate this by the graphics of the golfer swinging his club in *Leader Board*. Before we video tape anything, we have to determine the camera angle of each shot ahead of time. In some cases we use a wide angle lens point of view and at other times a telephoto shot is necessary. We also have to define the width of the viewing window, how high off the ground the viewer is, where the horizon is located, and so on. Once the camera is properly positioned for the shot, we record the swing several times on tape. Whenever you see the golfer swing a club in *Leader Board*, you're actually watching Roger on the screen. He is an excellent golfer and his swing was exactly what we wanted for the game.

After the video shots are completed,







"When we started Leader Board, *we tried to install trees, roughs and traps into the design of the game. Unfortunately, our first effort was a failure."*

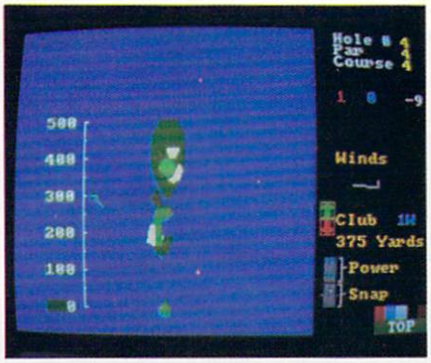
we return to the office and examine our work on an high-quality VHS video recorder. We use this machine because it doesn't display the sound bar on the monitor. If you don't know what a sound bar is, pause a video tape while it's playing on most recorders and you'll see a pattern of wavy lines. That disturbance of the image is the presence of the sound bar.

As I was saying, when we return to the office, we begin examining the different video recorded sequences of a swing frame by frame. Frames are marked from the different shootings of a scene because they look smooth and have a clear, distinct image. On the average, we try to select every fourth frame from each shooting. Once we've gone through and marked the best frames, we have a catalog of frames to choose from as we reconstruct the swing for the game. A starting frame is selected as the beginning of the swing, with other marked frames being added to the sequence to make the swing cycle a smooth, even motion.

In *Leader Board*, the golfer can complete the entire action of a swing with 32 frames of video tape. That means we have to shoot 150 frames or more of a swing to have a decent amount of source material to work with.

R. Carver: Once we have put together a series of frames that perform the swing, I photograph each frame of the sequence with an instant slide camera. A slide is fully developed and ready for use in about 12 minutes. Each slide is then placed within a slide projector and the image is projected on a special glass screen. This plate can move backward and forward, which allows us to scale the size of the golfer to that of his surroundings in the game. The glass screen also has a grid on it which corresponds to the pixel grid we see on the screen.

Once I'm satisfied with the size of the golfer, I put a piece of paper on the plate and trace the image by hand using colored pencils. These pencils are the same colors that have been assigned to the golfer in the game. After the sketches are made, we simply translate the colored grid block information from paper to the computer



screen with Spritemaster II. (You won't find this program on the market; we created it for our own use.)

B. Carver: Roger does most of the work during this phase of the operation. Whenever we take some video tape through this whole procedure, it usually requires about three weeks of labor to finish. All of the frames go through each step as a batch. If the need arose, I believe a single frame could be processed in two or three hours. After the work is done, we are left with the image of a golfer swinging a club on a blank screen. At this point in the project we join forces to create the background graphics, put together the data base we need, and make any revisions that might be necessary.

Jermaine: How did you begin the *Leader Board* project?

R. Carver: When we started working on the first sports-related program, golf was merely a small component of our game concept. Bruce and I wanted to put together a collection of four different sports challenges on a single disk. These sports segments would include a baseball home run derby, a penalty kicking scene from soccer, a closest-to-the-pin competition for golfers, and another contest. In case you don't know what closest-to-the-pin is, we had planned to create a par-three course where the player would have three shots to get as close to the pin or hole as possible. We worked on the golf challenge first because I already knew every aspect of the game. My knowledge of the subject made closest-to-the-pin one of the most accurate computer golf games on the market, while our new graphics seemed to teleport the player to a real golf course. Our product was superior to any golf program we had seen at that time, so Bruce and I dropped the idea of developing other sports challenges and concentrated on making it into *Leader Board*. We started working on *Leader Board* during August of 1985 and it was finished approximately six months later.



Jermaine: How well do both of you actually play golf?

R. Carver: I have been playing golf since I was 12 years old, so I have about 20 years of experience. My present handicap is 10 because I only get to play about once a month, but shortly after I left high school, my handicap was 3. My present handicap is slightly inflated though, because a lot of times I shoot par golf.

B. Carver: Roger is a bit modest. He's an excellent golfer. I'm just a hacker (no pun intended). Whenever I play nine holes, it usually takes me 40-50 strokes to complete the course.

Jermaine: Do you play *Leader Board* equally well?

R. Carver: I pride myself on being the best computer golfer here. If I get par on any hole, I'm upset.

B. Carver: My best score playing *Leader Board* was 15 under par for 18 holes on the pro level. That score was way beyond my normal capabilities. Roger holds the Access record. He scored 22 under par for 18 holes in the pro level of play on the third course of the game. This is the most difficult course on the original *Leader Board* disk, and it's very hard to achieve a score like this. I'm sure he didn't make a single mistake that day.

Jermaine: How does the computer draw the islands for the game?

B. Carver: First you define the islands as polygons. A polygon is a multi-sided figure, and we can place seven of these polygons into the design of each hole. There are also approximately 30 different island designs to choose from that vary in size and shape. If, for example, we need an island type #10 to tee off from, the computer searches the data base of the program for the information we need to construct such an island, and then coordinates where it has to be located in respect to the hole. Every time you play this particular hole, island #10 will always be located in the same position. After the computer locates the data it needs to construct island #10 properly, a brown ring is drawn at water level to represent the base of the island. More brown rings are rapidly added to the figure until the island reaches a height of 24 inches. The final ring is drawn green, and filled in with the same shade of green. Believe it or not, getting the green outline to fill was one of the toughest problems we had during the evolution of the game. Other graphics are added once the islands are completed.

R. Carver: When we constructed the islands on the screen, we had the option of leaving the screen blank until the drawing was completed or letting the user observe the scene taking shape right before his eyes. We chose the latter because the process is somewhat entertaining to watch. In the Amiga version, the drawing of the updated picture has been totally eliminated. After each shot has been completed, the new image immediately appears on the monitor.

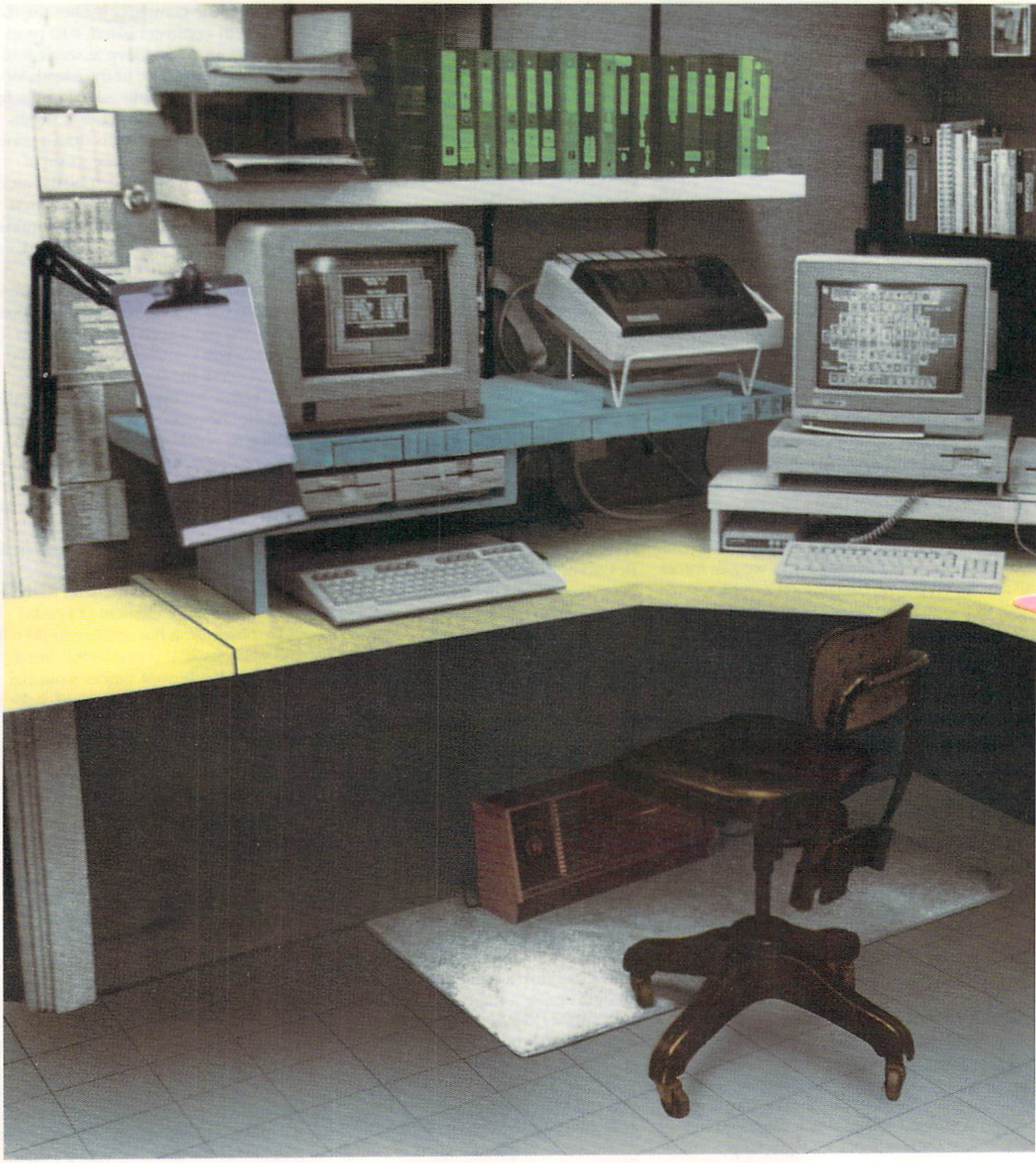
Jermaine: Was it hard to simulate an authentic golf swing?

R. Carver: It was very difficult to develop the hook/slice element of *Leader Board* because it has nothing to do with the swing itself. It is tied to the swing by a system of interrupt timers. Consider for a moment that a game like *Leader Board* is your favorite television show. Commercials are similar in nature to the interrupts we use in our software. Both occur at regular intervals, and do something different for a short period of time. Once the interruption has taken place, the regular program is re-activated from the precise point where it was stopped.

In *Leader Board*, there are two types of interrupts: raster and timer-A. Our raster interrupt occurs 60 times a second and downloads the sprite data whenever the computer needs it. The raster also tells the computer how long to display each frame of the swing sequence. Screen updating starts after the raster occurs and is completed before the interrupt comes around again to complete a cycle or count. By doing things in this manner, you don't get any flicker in the graphics of the golfer swinging a club.

Timer-A interrupt counts are very fast and can be performed thousands of times a second. We use timer-A interrupts to maintain the smooth, even flow of the power snap indicator. The indicator and the swing itself are also tied together by another timer-A interrupt, which coordinates the activities of both

Continued on pg. 124

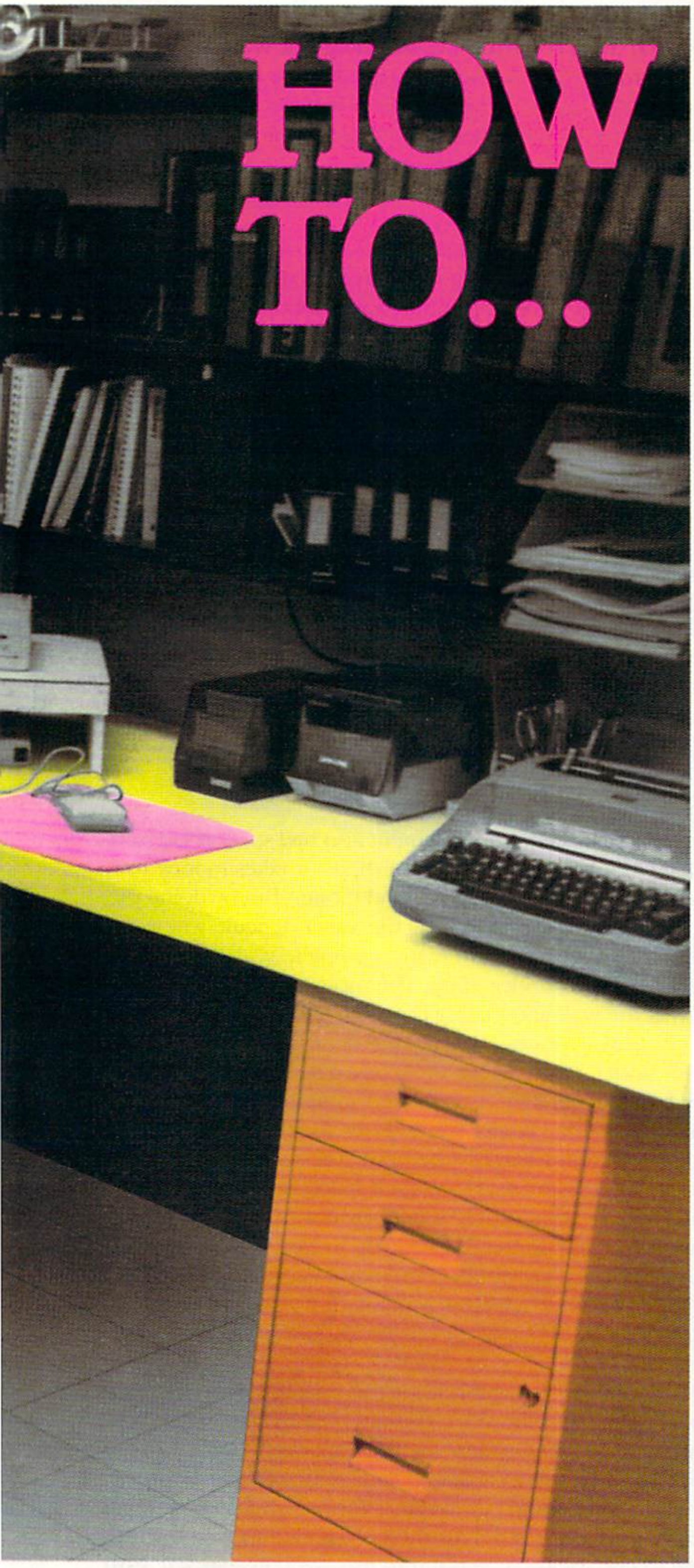


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Paper Holder—Swing-arm lamp $9, clipboard $1.89 and four-inch bolt with nut 35¢.

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HOW TO... Keep It Safe, Happy and Affordable

Giving your Computer a Home

BY GARY V. FIELDS

Let me remind you who is giving this advice—Mister Sensible. (My wife prefers to call me Mister Cheap.) I base my purchasing decisions on value rather than price. I rarely buy the most or least expensive items—instead, I try to buy the most sensible. Like raising children, computers don't have to have the most expensive care, just the best you can afford.

Finding a Home

Your computer's home should be determined by how the system is going to be used. If you intend it for entertainment, you want it where the family can gather. If you want it for educational programs, a child's bedroom is logical. (I've explored the positives and negatives of most of the areas in my home the hard way—I've relocated my systems three times over the years.) The size of your family also determines the location. If you are single or all your children are grown, almost any room in the house will do.

But regardless of where you put the system, make it feel at home. Pick a spot where it is always ready for use and you'll feel comfortable using it. The computer is a powerful tool, but it can't help if it's packed away in the closet.

The three most obvious rooms to choose from are the livingroom, bedroom or kitchen. I eliminated the kitchen from consideration right off—sticky foods, drinks and computers don't mix. There is one hard rule at our house: food and liquids aren't allowed near the computers. After hearing technicians at the office complain about having to clean dozens of terminals with dead or sticking keys simply because someone's potato chip crumbs jammed the keyboard, we decided food was off limits. While food particles can jam a system, drinks can actually kill it. Spill one un-cola and you've got one un-computer.

If you've ever rubbed your finger across the top of a high window frame near the stove, you've seen how much greasy lint can collect. Imagine the problems that grease and dust

Disk Holders—Notebook, paper, tape, holds 20 disks, each $3.

File Cabinet—Saved $30 by shopping around.

Desk and Countertop—White tile board, cheaper and easier to install than Formica.™

Heater—Electric and easy to install.



By designing the room around my system instead of making my system fit in an existing room, I was able to locate electrical outlets and telephone plugs exactly where they needed to be instead of stringing wires everywhere.

could cause for your keyboard. Needless to say, with those kind of dangers lurking in a kitchen, that room was never seriously considered as a home for our system.

However, there was a nice side effect of this no food rule—I lost weight. Without munchies to clog either my keyboard or my stomach, I lost nearly 30 pounds the first six months the computer was in the house. People kept asking what I was doing to trim down. When I replied I had bought a computer, they thought I was crazy. After a while I got tired of their odd responses and just lied and told them I was very ill. (It was an easy way to get sympathy and stopped the questions. I got some nice flowers too.)

The livingroom is the logical location if you intend to use your television for a monitor. But if your family numbers more than one, be prepared to fight some battles over who gets to use the TV. A good word processor may be wonderful for the user, but on-lookers lose interest very quickly.

The bedroom offers more privacy, but those of use who like to compute late into the night need to be conscious of the need of others to sleep. A good game of *Two-On-Two* basketball may relax you, but your spouse trying to count sheep may not agree.

A logical add-on for those who want their night computing and sound too should consider purchasing a set of headphones. Most of the newer monitors are now equipped with audio outlets so you can keep the sound in your ears and out of the house. If you own an older monitor or TV with no headphone jack, you can either wire a plug outlet or buy an accessory with such a feature. Covox's current Voice Master module has an outlet which will divert the sound to the headphones regardless of what program is being run on the computer.

If you have pets in the house, be extra careful wherever you park your computer. One of our cats had a dangerous desire to chew on electrical cords. Of course, in this case, the cat persisted, and the problem cured itself. (The cat is no longer in the world of the living—but that's another story.)

Pets also have a nasty habit of shedding hair which can clog the keyboard or, even worse, settle inside your disk drive or a disk's protective sleeve, where it can play havoc with the data stored on the sensitive surface. So my advice is to eliminate any area where a pet is allowed.

Moving In and Out

I finally settled on the basement. I can't remember if it was my decision or my wife's, but we both agreed that I needed to locate all my boxes, desk, printer paper, ribbons, cords, keyboards, rolling chairs, joysticks, wire, filing cabinets, modems, monitors, telephone, memory maps, bulletin boards, and push pins somewhere else. (Actually, I thought the stuff looked good in what was supposed to be the formal diningroom, but she didn't.)

The basement had some good points. First, it was unfinished, so I could design the room to suit me and my system's needs. Second, it was cool, and you know how computers love cool rooms. I was happy to get rid of the windows in the diningroom, too. Windows generate heat and the late evening sun made the glare on my monitors terrible at times. The basement solved both problems.

Third, the basement offered privacy. Here I can concentrate without interruptions from children or TV programs. The door is always closed, so the cat can roam freely and both the computer and the cat are safe.

Saving the Budget

But fixing a place in the basement also had some shortcomings. First, the basement was unfinished—it takes money to finish a basement and I hate to spend money. But by doing the work myself (framing and laying tile aren't difficult, just time-consuming), I got the room ready, complete with finished counter space, for under $500. The most expensive consideration was the wall and ceiling covering.

By comparing prices I was able to get a good grade of paneling for under $8 per sheet. I picked a pale panel so the room would be easier to light. I also saved some big bucks on the ceiling as well. One dealer wanted 89¢ for the tiles, while a competitor across town had the same tiles on sale for 29¢.

In my diningroom, usable surface space had come at a premium. I avoided that problem here by covering one entire wall with a deep counter. If I had had to buy the counter, I would have broken my budget quickly. Instead, I refinished an old kitchen counter which was going to be thrown out for trash. A new top and a coat of paint made it perfect for my needs.

I got a solid smooth surface for the counter space by using tile board (like in a shower). The tile board was cheaper and easier to install than formica since all I needed to stick it to the plywood surface was a caulk gun and a tube of liquid adhesive. It's true the surface isn't as tough as formica, but I've found it perfect for my purposes. Plus there's no need to wait for the surface to cure before you put it to use—you just stick it, trim it and use it. I used white tile board to make the room as well lit as possible.

I got my two office chairs from where I work. When I bought them, they were broken pieces stored in the warehouse. I bought the four chairs for $5 each (the maintenance men thought I was wasting my money), and created two sound chairs from the pieces of the four. My wife then covered them with another $10's worth of upholstery material.

The obvious solution for a desk considering both space and

price needs was a desk created with filing cabinets for support and a tileboard-covered particle board for a surface. A desk from an office supply house wouldn't have given me any more useable surface space, and the three filing cabinets supplied more than adequate storage space.

Speaking of saving big bucks on filing space—the price of the same filing cabinets (same size and manufacturer) varied $30 per unit, depending upon which store I shopped! If I learned anything from trying to avoid all the extras my systems need, it is to compare prices and look not only at the products I want but how they are constructed.

By designing the room around my system instead of making my system fit in an existing room, I was able to locate electrical outlets and telephone plugs exactly where they needed to be instead of stringing wires everywhere. Fluorescent workshop-type lights countersunk in the ceiling supply glare-free inexpensive illumination.

The pale surroundings reflect the light, giving the room a healthy, cheerful glow. I saved a little money on the lighting by constructing the covers to fit inside the ceiling supports rather than buying presized fixtures. I saved again on the covers by purchasing cracked covers from the supply house and trimming them to fit.

Do you need a mouse pad for your mouse? I thought I did until I priced them. Then I noticed that a typewriter cushion was made of the same material and cost only $1.75.

The floor is tile, which makes it easy to install and clean, and more importantly, less prone to static electricity than carpet. Ask anyone who works with transistors or microchips and they'll testify that static electricity, discharged in the wrong place, can kill a system just as quickly as lightning. If your computer room is carpeted, you might want to ground your system by running a wire from the frame of each unit to either an outlet ground or a copper water line. You can also buy anti-static spray. Low humidity also increases the chance of static build-up. Normally, low humidity (below 50%) is not a problem in a basement (tell me about it)— another reason I found it ideal for my systems.

By planning the location of each piece of the systems, I was able to park my favorite printer where it can be shared by both my 128 and Amiga. I was also able to maximize the use of my shelf space by designing the height, width and location of each to conform to the size of the books and disk storage units they would hold.

Now, I know that finishing a room may not be an affordable or logical alternative for many, but the most important thing is to use the space available to the maximum. Any room in the house can be a perfect location for this addition to your family, but if you want to get the most out of the system, select the location carefully and then design the working area so you and the computer can happily coexist.

Now that all the sawdust has been removed and the blue from my thumbnail has begun to fade, I realize that this is where my computer should have been located from day one. I insulated the ceiling and walls before I put up the walls so the room is not only easy to heat in the winter but is nearly soundproof—my computing doesn't bother the rest of the family and they don't bother me.

The system is also more secure here, because the single window doesn't offer a view of what's in the room. Insurance coverage for your system is a necessity too often forgotten until it is too late. Your home owner's policy may cover your system, but the time to ask is before you need to submit a claim. There are policies available to cover everything from your hardware to your favorite word processor. But don't assume they are covered—ask your insurance agent.

No location is perfect. Basements can be pretty humid places and computers prefer medium range humidity (50 to 70%). I solved that problem with a dehumidifier. And as far as heating goes, even though it is more expensive, I opted for electric heat because it is easier to install. (My wife says the only time I'm not cheap is when I'm lazy.)

I was tempted to use a kerosene heater, but there have been warnings citing the dangers of the fumes on delicate electric circuit boards like those inside computers and monitors. The fumes may be corrosive to the tiny wires.

Invisible Killers

Speaking of invisible dangers, keep aerosol-applied liquids out of the computer room. Hair spray and spray paint can coat your systems with an invisible, thin layer of insulation. The mist will find its way inside the keyboard casing, dry on the circuit board, and in time, may restrict the flow of electricity.

Another killer could be your electrical outlets themselves. It is important that the polarity of the outlets all agree. Normally, the large opening in an outlet is the ground and the small opening is the live side. Unfortunately, sometimes handymen, or even a licensed electrician, makes a mistake and reverses the polarity. Most other appliances don't care which side of the outlet is hot and which is grounded, just as long as it offers an unbroken circuit.

What happens is the hot voltage will be running on both the ground and power lines resulting in a head-on collision inside your system—resulting in a major derailment. This is avoidable if all the plugs from your system are plugged into a multi-outlet extension cord. This assures that the polarity of the entire system is uniform.

Most of these outlets contain their own fuse, which eliminates the danger of outside voltage spikes injuring your system. When buying one of these units, be cost conscious. Depending upon where you buy, units can vary in price from as high as $79.95 to as little as $7.95.

Magnets are invisible dangers you should keep out of your computer room. One magnet loose in your disk files can do more damage than a four-alarm fire. Because the information on your disk is written by a magnetic pulse from your disk drive, a small toy magnet can scramble the information and make the disk useless. Be aware that magnets are found almost everywhere in the house—telephones, speakers, electric motors, paper clip holders, magnetic pins, and keep them away from your disks.

Affording Your System Without Mortgaging Your Home

I can think of few important purchases in life in which I didn't have to spend more for the item than I had planned. My first computer was no exception. I remember reassuring my wife that all I needed was the computer, a disk drive and a few blank disks. Two weeks later I was showing her the ad for a

Continued on pg. 126

BY JAMES C. HILTY

The Jupiter Jump

for the Commodore 64

The planet Jupiter has long been known as the dance capitol of the universe. The inhabitants, known as Jupees, would rather dance than do almost anything else, anything except challenge you to a duel.

Upon your arrival on the planet, you are immediately challenged to a fight. You must participate in a Jupiter duel to the end. On this planet, a duel means four Jupees against one of you. You must maneuver your spaceship against the Jupees and hit as many of them as you can.

This is the background for The Jupiter Jump, an arcade game for the 64. The four Jupees come at you from the north, south, east and west. Using a joystick, you can point your spacecraft in any of these four directions. Your laser is on constantly, so you do not have to press the fire button. However, your laser is limited in range. It will not reach the edges of the screen where the Jupees start from. You must allow the Jupees to come in a little. If you don't, the Jupee will jump back when you fire at him. You receive points for each Jupee that you hit.

You begin the game at level one. After a short time you progress to the next level. At each successive level the Jupees move at different speeds. Sometimes they move very fast. No Jupee moves at the same speed.

You begin with three spaceships. If a Jupee gets one of your ships, then a dance starts. The Jupee will dance on your ship until it is destroyed; you might say he does a break-dance. Once you lose three ships, the game is over. The score, high score, ships and level are displayed on the screen at all times. Each hit is worth more points on each higher level. For example, on level 1 each hit is worth 6 points, while on level 20 each hit is worth 25 points.

How It Works

The Jupiter Jump features a very quick play response as well as a good deal of animation. At times, the Jupees almost



GORDON KIBBEE

The Jupee will dance on your ship until it is destroyed.

appear to be alive. The program is relatively short and is written entirely in BASIC. Of course, this appears to be a contradiction. It is true that BASIC is fairly slow, so how can an arcade game be written in BASIC and still be fast enough to wear out your joystick? The answer is in planning.

First, you must realize the limitations of BASIC. You are not going to move eight sprites around smoothly and rapidly using BASIC. In The Jupiter Jump we are only going to move four sprites. With these four sprites we are only going to change one direction for each sprite. Thus, four pokes will move all four sprites. Line 200 in the program moves all four sprites in different directions based on the changing of four variables. These variables are changed in line 215.

Checking for screen boundaries with sprites takes an awful lot of time in BASIC. We don't have to do that in this game. Since your spaceship is in the middle of the four Jupees, all we do is check to see if a Jupee has hit your ship (line 218). If one has, then you lose a ship and the four Jupee sprites are put back in their original starting positions. Thus the sprites can move very fast using BASIC, as long as we limit what we do.

The main action loop must be kept very short in a BASIC action game. The more the main loop has to do, the longer it will take for something to occur. The main loop here is lines 200-220.

Too many IF-THEN statements can slow down a BASIC program. For example, since your laser is constantly firing in this game, how does the computer know which way to fire the laser? You could use IF-THEN statements, but it is faster to use a ON-GOTO statement. The spaceship can face north, south, east or west by changing the sprite pointers which are 208, 209, 210 and 211.

The spaceship is sprite #4 and the pointer for this sprite is poked into location 2044. By peeking location 2044, you are able to see which sprite pointer is in memory. If you subtract this value from 212, you end up with 1, 2, 3 or 4. You can then go to the proper subroutine to fire the laser in the proper location. All of this takes place in line 400.

Fast Print

The subroutines which fire the laser in the four directions begin at lines 410, 440, 470 and 500. The laser beam is printed at the proper locations, a check is made to see if a sprite was hit, and the beam is erased with PRINT statements. PRINT is fairly fast in BASIC. The program is returned to the main loop and the game continues. A fairly elaborate title screen is also created using PRINT statements (lines 820-880).

Visuals and Sound

Scrolling backward and ever-changing scenery is almost impossible without machine language. In a BASIC game, the visual impact has to come elsewhere. In The Jupiter Jump, a lot of animation is used outside of the main loop. When the level changes or when a ship is hit, the Jupees do a dance called the Jupiter Jump. This involves rotating the Jupees through eight sprite shapes at different speeds using sound effects. This is fairly complicated and takes time, but you can take some time, since the action has stopped on the screen.

This is where you can bring in some visual and sound effects in a BASIC game—when the main action stops momentarily. It keeps the player glued to the screen and makes a BASIC game more visually exciting. You can use all of the sound effects you want, as long as they are not in the main loop of a BASIC game. Sound takes a lot of pokes in BASIC and

slows things down, but without sound, a game is just not a game.

The End Product

In order for a computer game to be successful, the player should want to play the game again and again. This is true no matter what language the game is written in. Every programming language has its advantages and limitations. Commercial games would not be what they are without machine and assembly languages. But for learning how to program games, BASIC is an excellent language. It is easy to follow so you should be able to see what other programmers are trying to do. For a person trying to learn to program on a personal computer, one of the best learning aids is typing in a program from a magazine, and for a new user, BASIC is the place to start.

I hope you enjoy The Jupiter Jump, and don't let the Jupees do too many break-dances on your spaceship! ■

Before typing these programs, read "How to Enter Programs," and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

The Jupiter Jump

```
50 V=53248:HS=0:SC=0:LV=1:LP=0:SH=3
   :SD=54272:RM=10'IOBQ
60 PRINT"[CLEAR]"TAB(10)"ONE MOMENT
   PLEASE"'CDVJ
70 GOSUB 800'BDLE
80 PRINT"[CLEAR]":POKE V+21,0
   :PRINT TAB(2)"[RVS,CYAN]
   SCORE "TAB(24)"[RVS,YELLOW]
   LEVEL "'GMKP
90 PRINT TAB(3)SC TAB(27)LV
   :PRINT TAB(2)"[RVS,L. RED] HIGH
   [SPACE2]"TAB(24)"[RVS,L. BLUE]
   SHIPS "'GPXQ
100 PRINT TAB(3)"[WHITE]
    "HS TAB(27)SH'DJIY
110 POKE V+16,0:POKE V+0,144
    :POKE V+1,50:POKE V+2,255
    :POKE V+3,138:POKE V+4,144'MOUM
120 POKE V+5,229:POKE V+6,24
    :POKE V+7,138:POKE V+21,31'IBSH
130 GOSUB 700'BDKY
140 YN=50:XE=255:YS=229:XW=24'EVZH
142 PRINT"[HOME,DOWN2,WHITE]
    "TAB(27)LV'CFTD
145 IF LV>15 THEN E=14:N=22:W=18
    :S=INT(RND(5)*12)+12:GOTO 195'MFXS
150 IF LV>3 THEN E=INT(RND(5)*9)+9:S=8
    :W=12:N=INT(RND(6)*14)+12
    :GOTO 195'QIUR
155 IF LV>1 THEN N=INT(RND(5)*6)+4:S=6
    :E=INT(RND(6)*8)+4:W=6
    :GOTO 195'QFVW
160 N=2:S=3:W=2:E=3'ELYG
195 W1=PEEK(V+30)'DHAM
200 POKE V+1,YN:POKE V+2,XE
    :POKE V+5,YS:POKE V+6,XW'IXNH
202 LP=LP+1:IF LP=40 THEN LV=LV+1:LP=0
    :GOTO 110'JXRJ
205 JY=PEEK(56321)AND 15'DLAF
210 IF JY=7 THEN POKE 2044,210'ELVB
211 IF JY=11 THEN POKE 2044,211'EMKD
212 IF JY=13 THEN POKE 2044,209'EMTE
213 IF JY=14 THEN POKE 2044,208'EMTF
214 GOTO 400'BDDC
215 YN=YN+N:XE=XE-E:YS=YS-S
    :XW=XW+W'IXEO
218 W1=PEEK(V+30):IF W1>16 THEN
    600'GPGM
220 GOTO 200'BDBY
400 Z=212-(PEEK(2044)):ON Z GOTO 410,
    440,470,500'FEJH
410 PRINT"[HOME,DOWN11,L. RED]"
    :TB=15'CFEC
412 FOR T=1 TO 10:PRINT TAB(TB)"
    [CMDR T,UP]":TB=TB-1:NEXT'IPPK
415 W2=PEEK(V+31):IF W2=8 THEN C=42
    :GOSUB 550'ISBN
420 PRINT"[HOME,DOWN12,SPACE16]"
    :POKE V+6,24:XW=24:POKE V+42,
    14'GSRK
425 W2=PEEK(V+31):W1=PEEK(V+30)
    :GOTO 215'HTVN
440 PRINT"[HOME,DOWN11,L. RED]"
    :TB=20'CFAF
442 FOR T=1 TO 10:PRINT TAB(TB)"
    [CMDR T,UP]":TB=TB+1:NEXT'IPON
445 W2=PEEK(V+31):IF W2=2 THEN C=40
    :GOSUB 550'ISSQ
450 PRINT"[HOME,DOWN12,L. RED]
    "TAB(20)"[SPACE10]"'CDYH
455 POKE V+2,255:XE=255
    :POKE V+40,13'FTWP
460 W2=PEEK(V+31):W1=PEEK(V+30)
    :GOTO 215'HTVM
470 PRINT"[HOME,DOWN13,L. RED]"
    :FOR T=1 TO 8:PRINT TAB(18)"
    [CMDR H]":NEXT'HJCN
475 W2=PEEK(V+31):IF W2=4 THEN C=41
    :GOSUB 550'ISVT
480 PRINT"[HOME,DOWN13]":FOR T=1 TO 8
    :PRINT TAB(18)" ":NEXT'HJIN
485 POKE V+5,229:YS=229
    :POKE V+41,10'FTPS
490 W2=PEEK(V+31):W1=PEEK(V+30)
    :GOTO 215'HTVP
500 PRINT"[HOME,DOWN9,L. RED]"
    :FOR T=1 TO 8:PRINT TAB(18)"
    [CMDR H,UP2]":NEXT'HJUI
505 W2=PEEK(V+31):IF W2=1 THEN C=39
    :GOSUB 550'ISAN
510 PRINT"[HOME,DOWN9,L. RED]"
    :FOR T=1 TO 8:PRINT TAB(18)" [UP2]
    ":NEXT'HJCI
515 POKE V+1,50:YN=50:POKE V+39,1'FQJL
520 W2=PEEK(V+31):W1=PEEK(V+30)
    :GOTO 215'HTVJ
550 POKE V+C,2:FOR T=0 TO 20:NEXT
    :POKE V+C,1:POKE SD+11,129
    :FOR T=0 TO 20:NEXT'OFYT
552 POKE SD+11,128'CIBJ
555 POKE V+C,15:POKE V+C,12
    :POKE V+C,11:POKE V+C,0'IWHT
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```
560 SC=SC+5+LV:PRINT"[HOME,DOWN2,
    WHITE]"TAB(3)SC'FMUL
565 RETURN'BAQK
600 FOR I=0 TO 24:POKE SD+I,0
    :NEXT'GLPG
602 IF W1=17 THEN X=2040:GOTO 620'FNEH
604 IF W1=18 THEN X=2041:GOTO 620'FNBK
606 IF W1=20 THEN X=2042:GOTO 620'FNAL
608 X=2043:GOTO 620'CJUL
620 POKE V+43,2:POKE SD+24,143
    :POKE SD+5,16:POKE SD+19,16
    :POKE SD+6,252'KMQQ
622 POKE SD+20,249:POKE SD+4,21
    :POKE SD+18,17:POKE SD+1,68
    :POKE SD+15,42'KNHS
624 FOR I=0 TO 200:NEXT:POKE SD+4,20
    :POKE SD+18,16:FOR I=0 TO 400:NEXT
    :POKE V+43,0'OJMV
626 L=200'BESJ
628 FOR T=0 TO 80:POKE X,L:L=L+1
    :IF L=208 THEN L=200'KVLV
630 NEXT'BAED
632 SH=SH-1:PRINT"[HOME,DOWN4,WHITE]
    "TAB(27)SH:IF SH=0 THEN 650'HSUO
634 POKE X,200:POKE V+43,15
    :GOTO 110'EQDM
650 FOR I=0 TO 24:POKE SD+I,0
    :NEXT'GLPL
652 POKE SD+24,15:POKE SD+5,80
    :POKE SD+6,243:POKE SD+3,7'IDUS
654 FOR J=70 TO 20 STEP-1:POKE SD+4,65
    :POKE SD+1,J:FOR I=0 TO 030:NEXT
    :POKE SD+4,64'PIKA
656 FOR I=0 TO 20:NEXT:NEXT'FGQP
658 POKE V+0,144:POKE V+1,50
    :POKE V+2,255:POKE V+3,138
    :POKE V+4,144'KICB
660 POKE V+5,229:POKE V+6,24
    :POKE V+7,138'GTDN
662 FOR T=0 TO 30:PRINT"[HOME,DOWN15,
    CYAN]"TAB(12)"[SPACE11]"'FIJP
664 PRINT"[HOME,DOWN15]"TAB(12)"[RVS]
     GAME OVER ":NEXT T'DFKQ
666 PRINT:PRINT TAB(11)"[L. RED,RVS]
     PLAY[SPACE2]AGAIN ":PRINT
    :PRINT TAB(14)"[YELLOW,RVS]
     Y OR N "'GJGX
668 GET JK$:IF JK$<>""THEN 668'FKJT
670 L=200'BESI
672 FOR X=2040 TO 2043:POKE X,L:NEXT
    :L=L+1:IF L=208 THEN L=200'LCOW
674 GET A$:IF A$=""THEN 672'EIOP
676 IF A$="Y"THEN 680'DFOQ
678 END'BACP
680 IF SC>HS THEN HS=SC'EIVM
682 SC=0:LV=1:LP=0:SH=3:POKE V+43,15
    :GOTO 80'HAHU
699 REM    CHOREOGRAPHY'BMAW
700 RESTORE'BAOB
702 FOR I=0 TO 24:POKE SD+I,0
    :NEXT'GLPJ
704 POKE SD+1,15:POKE SD+5,16
    :POKE SD+6,240'GVBN
705 READ A:IF A=0 THEN 715'EHSJ
710 FOR X=2040 TO 2043:POKE X,A:NEXT
    :POKE SD+15,RM:POKE SD+24,31
    :POKE SD+4,21'LMWR
712 RM=RM+1:IF RM=20 THEN RM=10'GOFL
713 GOTO 705'BDLG
715 FOR I=0 TO 24:POKE SD+I,0
    :NEXT'GLPN
716 POKE SD+24,15:POKE SD+12,160
    :POKE SD+13,252:POKE SD+8,80
    :POKE SD+7,40'KOYW
718 POKE SD+11,128:RETURN'DJAN
720 DATA 200,201,202,203,202,204,200,
    204,202,203,202,201,200'BBVN
730 DATA 205,206,207,200,207,206,205,
    200'BGGK
740 DATA 200,201,202,203,202,204,200,
    204,202,203,202,201,200,0'BDMP
800 READ A:IF A=0 THEN 810'EHOF
805 GOTO 800'BDHI
810 FOR X=12800 TO 13566:READ A
    :POKE X,A:NEXT'GSFK
815 PRINT"[CLEAR]":POKE 53281,0
    :POKE 53280,0'DQON
820 PRINT TAB(19)"[YELLOW]THE":PRINT
    :PRINT:PRINT TAB(9)"[RVS,SPACE3]
    "TAB(20)"[RVS] "'HLLM
825 PRINT TAB(8)"[GREEN,RVS,SPACE2,
    YELLOW] "TAB(19)"[GREEN,RVS]
    [RVOFF,SPACE3,RVS,YELLOW] "'DFWP
830 PRINT TAB(9)"[RVS,GREEN] [YELLOW]
     [RVOFF] [RVS] [RVOFF] [RVS]
    [RVOFF] [RVS,SPACE3,RVOFF] [RVS]
    [RVOFF] [RVS,SPACE3,RVOFF] [RVS,
    SPACE3,RVOFF] [RVS,SPACE3]"'CCOO
835 PRINT TAB(8)"[RVS,YELLOW] [GREEN]
     [YELLOW] [GREEN] [YELLOW] [GREEN]
     [YELLOW] [GREEN] [YELLOW] [GREEN]
     [YELLOW] [GREEN] [YELLOW] [GREEN,
    SPACE2,YELLOW] [RVOFF] [RVS,GREEN]
     [YELLOW] [RVOFF,CMDR U] [RVS,
    GREEN] [YELLOW] [GREEN] [YELLOW]
     "'CCDY
840 PRINT TAB(7)"[RVS,GREEN] [YELLOW,
    SPACE3,GREEN] [YELLOW,SPACE3,
    GREEN] [YELLOW,SPACE3,GREEN]
    [YELLOW] [RVOFF] [RVS,GREEN]
    [YELLOW] [RVOFF] [RVS,GREEN]
    [YELLOW,SPACE3,GREEN] [YELLOW]
    [GREEN] "'CCVR
845 PRINT TAB(7)"[RVS,GREEN,SPACE3,
    RVOFF] [RVS,SPACE3,RVOFF] [RVS]
    [YELLOW] [GREEN] [RVOFF] [RVS]
    [RVOFF,SPACE2,RVS] [RVOFF,SPACE2,
    RVS,SPACE3,RVOFF] [RVS]"'CCNU
850 PRINT TAB(15)"[RVS] ":PRINT
    :PRINT TAB(12)"[CYAN]
    WE LOVE TO DANCE,":PRINT'GJYR
855 PRINT TAB(6)"BUT WE'RE ITCHIN'
    FOR A FIGHT!":PRINT:PRINT'EEWW
860 PRINT TAB(14)"[RVS,YELLOW,SPACE3]"
    :PRINT TAB(13)"[RVS,GREEN,SPACE2,
```

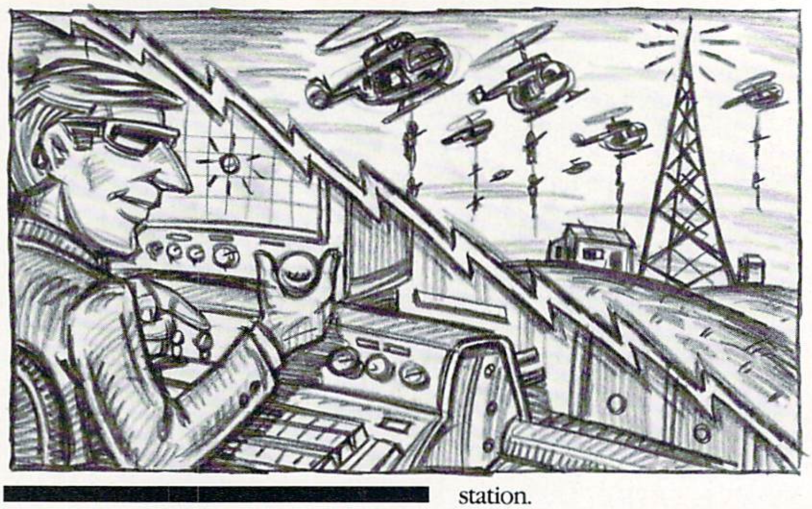
```
    YELLOW] "'EHNO
865 PRINT TAB(14)"[RVS,GREEN] [YELLOW]
    [RVOFF] [RVS] [RVOFF] [RVS]
    [RVOFF] [RVS,CMDR *,RVOFF] [RVS,
    SHFT POUND,RVOFF] [RVS,SPACE3]
    "'CDTV
870 PRINT TAB(13)"[RVS,YELLOW] [GREEN]
    [YELLOW] [GREEN] [YELLOW] [GREEN]
    [YELLOW] [GREEN,CMDR *,YELLOW,
    SPACE3,GREEN] [YELLOW] [GREEN]
    [YELLOW] "'CDKS
875 PRINT TAB(12)"[RVS,GREEN] [YELLOW,
    SPACE3,GREEN] [YELLOW,SPACE3,
    GREEN] [YELLOW] [GREEN] [YELLOW]
    [GREEN] [YELLOW,SPACE3]"'CDNV
880 PRINT TAB(12)"[RVS,GREEN,SPACE3,
    RVOFF] [RVS,SPACE3,RVOFF] [RVS]
    [RVOFF] [RVS] [RVOFF] [RVS]
    [YELLOW] [GREEN] ":PRINT TAB(24)"
    [RVS] "'EHUT
885 FOR X=2040 TO 2043:POKE X,200:NEXT
    :POKE V+39,1:POKE V+40,13
    :POKE V+41,10'LLFE
888 POKE V+42,14:POKE V+0,40
    :POKE V+1,74:POKE V+16,6
    :POKE V+2,36:POKE V+3,74'MLHI
890 POKE V+4,36:POKE V+5,210
    :POKE V+6,40:POKE V+7,210
    :POKE V+29,15:POKE V+43,15'MOBC
892 POKE V+8,156:POKE V+9,138
    :POKE 2044,208:POKE V+21,15'HESX
895 FOR Q=0 TO 1:GOSUB 700:NEXT'FIMU
900 RETURN'BAQD
1000 REM    SPRITE DATA'BKCV
1010 DATA 0,0,0,0,119,0,0,34,0,0,34,0,
     0,34,0,0,62,0,0,62,0,0,42,0,0,42,
     0'BMVF
1020 DATA 0,62,0,2,62,32,3,255,224,0,
     93,0,0,193,128,0,255,128,0,255,
     128'BLJH
1030 DATA 0,34,0,0,34,0,0,34,0,0,227,
     128,0,0,0,0'BNUD
1040 DATA 0,0,0,0,0,0,0,0,0,0,119,0,0,
     34,0,0,62,0,0,42,0,2,62,32,3,227,
     224'BOUJ
1050 DATA 0,255,128,0,255,128,0,34,0,
     0,227,128,0,0,0,0,0,0,0,0,0,0,
     0,0,0'BOFK
1060 DATA 0,0,0,0,0,0,0,0,0,0,0,0,
     0'BADE
1070 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0,0,255,128,3,255,
     224'BNVM
1080 DATA 0,255,128,0,255,128,0,0,0,0,
     0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
     0,0'BNVN
1090 DATA 0,0,0,0,0,0'BLBE
1100 DATA 0,0,0,0,0,0,0,0,0,0,227,128,
     0,34,0,0,255,128,0,255,128,3,255,
     224'BOLG
1110 DATA 2,62,32,0,62,0,0,62,0,0,34,
     0,0,119,0,0,0,0,0,0,0,0,0,0,0,
     0,0,0'BORH
1120 DATA 0,0,0,0,0,0,0,0,0,0,0'BVYA
1130 DATA 0,0,0,0,0,0,0,0,0,0,119,0,0,
     34,0,0,34,0,0,62,0,0,62,0,0,62,
     0'BKOI
1140 DATA 0,42,0,3,235,224,0,255,128,
     0,255,128,0,221,128,0,193,128,0,
     34,0'BNWK
1150 DATA 0,34,0,0,227,128,0,0,0,0,0,
     0,0,0,0,0'BLKG
1160 DATA 0,0,0,0,16,0,0,16,0,0,16,0,
     0,16,0,0,124,0,0,124,0,0,120,0,0,
     120'BNFM
1170 DATA 0,0,124,0,0,124,0,0,252,0,0,
     236,0,1,224,0,1,252,0,1,252,0,0,
     32,0'BOCN
1180 DATA 0,32,0,0,32,0,0,56,0,0,0,0,
     0'BDRH
1182 DATA 0,0,0,0,119,0,0,34,0,0,34,0,
     0,34,0,0,62,0,0,62,0,0,62,0,0,62,
     0'BMAP
1184 DATA 0,62,0,2,62,32,3,255,224,0,
     127,0,0,255,128,0,255,128'BCAQ
1186 DATA 0,255,128,0,34,0,0,34,0,0,
     34,0,0,227,128,0,0,0,0'BXYR
1190 DATA 0,0,0,0,8,0,0,8,0,0,8,0,0,8,
     0,0,62,0,0,62,0,0,30,0,0,30,0,0,
     62,0'BOBP
1200 DATA 0,62,0,0,63,0,0,55,0,0,7,
     128,0,63,128,0,63,128,0,8,0,0,8,
     0,0,8,0'BOKH
1210 DATA 0,28,0,0,0,0,0'BOVY
1220 DATA 0,0,0,0,0,0,0,0,0,0,24,0,0,
     24,0,0,24,0,0,60,0,0,60,0,0,126,
     0'BKEI
1230 DATA 0,126,0,0,255,0,7,60,224,6,
     60,96,14,24,112,14,24,112,4,0,32,
     4,0'BNGK
1240 DATA 32,4,0,32,0,0,0,0,0,0,0,0,
     0'BEEE
1250 DATA 0,0,0,0,0,0,0,0,4,0,32,4,
     0,32,4,0,32,14,24,112,14,24,112,
     6,60'BNBM
1260 DATA 96,7,60,224,0,255,0,0,126,0,
     0,126,0,0,60,0,0,60,0,0,24,0,0,
     24'BLPM
1270 DATA 0,0,24,0,0,0,0,0,0,0,0,0,
     0'BDXH
1280 DATA 0,0,0,0,0,0,192,0,7,240,0,
     0,240,0,0,16,0,0,8,0,0,14,0,0,63,
     128'BOWP
1290 DATA 0,255,240,0,255,240,0,63,
     128,0,14,0,0,8,0,0,16,0,0,240,0,
     7,240,0'BOIQ
1300 DATA 0,192,0,0,0,0,0,0,0,0,0,0,
     0'BCKB
1310 DATA 0,0,0,0,0,0,0,0,0,3,0,0,
     15,224,0,15,0,0,8,0,0,16,0,0,112,
     0,1'BMAI
1320 DATA 252,0,15,255,0,15,255,0,1,
     252,0,0,112,0,0,16,0,0,8,0,0,15,
     0,0'BLFJ
1330 DATA 15,224,0,3,0,0,0,0,0,0,
     0'BYKD
```

END

BY GERHARD SCHILLING

Radio Search

for the Commodore 64


JIM OWENS

You are an intelligence analyst at the super-secret National Security Administration. Your urgent task is to identify a terrorist group which is operating a clandestine radio station.

In front of you is a sophisticated radio detection console. You search for the terrorist station by finding its transmitting frequency. Help is provided through computer-controlled intelligence information.

When you have correctly identified the illegal station, you can fix its location by radar. A SWAT team will then be on its way and you have successfully completed your task. But you have only five minutes before the terrorists explode a bomb.

You have five minutes to find the terrorist radio station before a bomb goes off.

Operation

The screen displays an analog radio dial in the high-frequency 40-meter band. The specific frequency to which you are tuned is identified by the dial pointer and also in a digital display. You can change the frequency at any time by holding down the horizontal cursor key, either right or shifted to the left.

The detection equipment provides various kinds of information. The station transmitting on each frequency is identified by its official radio call sign. A horizontally-moving scroll presents a summary of the radio transmission, if any, as it is being received. A radar display may or may not show certain indicators.

After a transmission has ended, the screen lists the available options: Have the transmission repeated—press R key. Request an intelligence analysis—press I key. Tune to another frequency—press horizontal cursor.

If you think you have identified the terrorist transmission, press the * key for a radar fix. If your identification is correct, the SWAT team will catch the terrorists in time and the game is over. If you are wrong, you can continue to search until five minutes are up.

There are several clues which, as an intelligence analyst, you will have to find and recognize. Keep in mind that the covert terrorist station will probably change its frequency quite often and may show up anywhere on the dial, perhaps transmitting on top of a perfectly legal station.

The outcome of the game depends on how fast you decipher and combine all the clues which appear on the screen. Within its limitations, the intelligence analysis provided is always true.

Watch the somewhat ambiguous radar display and the accuracy of the call sign identification. You don't need to know Morse code to identify the terrorists. On the other hand, recognizing a few simple letters by sight or sound might just help.

You will also discover that you can hold down the * key and determine the outcome at almost any time while you are operating. Doing so before requesting an intelligence analysis may be risky, of course.

Programmers will note that each time a new game is started or the search is continued, it will be slightly different. The outcome, in terms of time elapsed, is determined in part by correct recognition of all clues and in part by chance.

Enough of that. Sit down at the radio console and find the terrorist station. Time is running short.

P.S.: If you find the game too easy, delete line 262.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Radio Search

```
2 POKE 53280,6:POKE 53281,6'CPXE
4 GOSUB 320:PRINT CL$;'CIBE
6 PRINT G$ SPC(3)"YOU ARE AN
  INTELLIGENCE ANALYST"'CEWO
8 PRINT SPC(10)"AT THE
  SUPERSECRET"'CDCM
10 PRINT SPC(3)"NATIONAL SECURITY
   ADMINISTRATION"'CCLH
12 PRINT:PRINT"YOUR TASK:"'CBFD
14 PRINT B$ SPC(5)"LOCATE A
   CLANDESTINE RADIO STATION"'CEJM
16 PRINT SPC(5)"OPERATED BY A
   TERRORIST GROUP."'CCOM
18 PRINT G$"YOUR MEANS:"'BCRJ
20 PRINT B$ SPC(5)"SOPHISTICATED,
    COMPUTER ASSISTED"'CEWJ
22 PRINT SPC(5)"RADIO DETECTION
   EQUIPMENT."'CCHI
24 PRINT G$"YOUR OPERATIONAL PROCEDURE
   :"'BCEK
26 PRINT B$ SPC(5)"1. IDENTIFY THIS
   COVERT STATION"'CEIO
28 PRINT SPC(8)"WHICH IS TRANSMITTING
   ON AN"'CCWP
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30 PRINT SPC(8)"ILLEGAL RADIO
   FREQUENCY."'CCMH
32 PRINT N$"INITIALIZING-WAIT
   ONE"'BCOI
34 GOSUB 330:PRINT U$ LL$ U$'CLNG
36 PRINT B$ SPC(5)"2. IF AND WHEN YOU
   THINK YOU HAVE"'CEPP
38 PRINT SPC(8)"IDENTIFIED IT,
    PRESS THE * KEY."'CCQQ
40 PRINT G$ "EVALUATION OF RESULT
   :"'BCCG
42 PRINT B$ SPC(5)"IF YOU ARE CORRECT,
    THE TERRORISTS"'CEYN
44 PRINT SPC(5)"WILL BE CAUGHT IN
   TIME."'CCIL
46 GOSUB 362'BDOH
48 PRINT G$ SPC(8)"BUT"B$ S$"IF YOU
   ARE WRONG, OR TAKE"'CIIS
50 PRINT SPC(8)"TOO MUCH TIME,
   "W$ S2$"B O O M ....."'CHMK
52 GOSUB 118:PRINT:GOSUB 434'DIQG
54 PRINT B$"TIME IS RUNNING... GOTO
   IT!"W$ S$"HIT ANY KEY"B$'BINR
56 PRINT TI:PRINT U$ TI$;
   :GOSUB 114'DNSL
58 GET K$:IF K$=""THEN 56'EHIN
60 POKE 53280,14:TI$="000000"'CMCG
62 PRINT CL$:K$=""'CGQG
64 X=INT(RND(0)*30)+1'FJDL
66 XX=INT(RND(0)*5)+1:GOTO 124'GNKO
68 PRINT U$ U2$ L2$:PRINT L2$'CMLN
70 PRINT TAB(X+4) U2$ W$
   CHR$(161)'ENMI
72 PRINT TAB(X+4) CHR$(161)'EIYJ
74 PRINT E$ L6$:RETURN'CGLJ
76 POKE S+24,15:POKE S+5,0'ELJN
78 POKE S+6,240:POKE S,75
   :POKE S+1,34'FRRR
80 AL$=MID$(A1$,I,1)'CMEH
82 IF AL$="."THEN GOSUB 100
   :RETURN'FHTK
84 IF AL$="-"THEN GOSUB 104
   :RETURN'FHWM
86 IF AL$="A"THEN GOSUB 100
   :GOSUB 104'FKFP
88 IF AL$="B"THEN GOSUB 104:GOSUB 100
   :GOSUB 100:GOSUB 100'HSCU
90 IF AL$="E"THEN GOSUB 100'EGXI
92 IF AL$="O"THEN GOSUB 104:GOSUB 104
   :GOSUB 104'GOPN
94 IF AL$="M"THEN GOSUB 104
   :GOSUB 104'FKVO
96 IF AL$="T"THEN GOSUB 104'EGMP
98 RETURN'BAQN
100 POKE S+4,17:FOR D=1 TO 20
    :NEXT'GLAB
102 POKE S+4,16:FOR D=1 TO 20:NEXT
    :RETURN'HMXD
104 POKE S+4,17:FOR D=1 TO 80
    :NEXT'GLGF
106 POKE S+4,16:FOR D=1 TO 80:NEXT
    :RETURN'HMEH
108 POKE S+6,241:POKE S+4,33
    :POKE S+1,21'GSYK
110 FOR J=0 TO 15 STEP 3:POKE S+24,J
    :NEXT'HMXC
112 FOR J=1 TO 10:NEXT:POKE S+4,32
    :POKE S+24,0:RETURN'JSOH
114 POKE S+24,15:POKE S+1,110
    :POKE S+5,9'GSBH
116 POKE S+6,9:POKE S+4,17:POKE S+4,16
    :RETURN'HRIK
118 FOR J=1 TO 20:POKE S+24,15'FLVJ
120 FOR T=1 TO 3:NEXT:POKE S+24,0'GKSC
122 FOR T=1 TO 3:NEXT:NEXT:RETURN'GGGD
124 R%=0:R$="":IF TI$<"000500"THEN
    132'FNQI
126 POKE 53281,2:POKE 53280,10'CQMH
128 PRINT CL$:GOSUB 118'CHWH
130 PRINT"YOUR TIME IS UP"TAB(255)
    W$"B O O M":GOTO 542'DKYH
132 IF RIGHT$(C$(R),1)="?"THEN
    C$(R)=LEFT$(C$(R),LEN(C$(R))-1)
    'IFTL
134 Y=INT(RND(0)*6)+1:R=X+XX'HNYJ
136 IF R>30 THEN R=R-30'FHBI
138 IF X<0 OR X>30 THEN X=0'GHTL
140 IN=0:PRINT CL$'CHEB
142 FOR J=1 TO 19:PRINT:NEXT'FGYF
144 PRINT S$ D$"AFTER"S$ B$"THE
    TRANSMISSION HAS ENDED,"'BIEO
146 PRINT"YOU CAN ASK FOR"S$
    D$"INTELLIGENCE ANALYSIS."'BEDQ
148 PRINT S$ E$"WHEN"B$ S$"YOU THINK
    YOU HAVE IDENTIFIED THE"'BIDT
150 PRINT"TERRORIST"Z$ E$ S$"PRESS *
    KEY FOR RADAR RANGING"'BGYM
152 PRINT CHR$(19);'CFKE
154 PRINT Z$ W$ S2$"<-CURSOR->";'BIYJ
156 PRINT S2$ S2$"MOVES DIAL AT ANY
    TIME"S$'BIRO
158 PRINT E$ L4$'BFPJ
160 PRINT S$ CHR$(180)
    S$"7.0"SPC(7)"7.1";'DMTG
162 PRINT SPC(7)"7.2"SPC(7)"7.3"S$
    CHR$(167)'ELHJ
164 PRINT L2$:PRINT L2$:PRINT L6$'DLPJ
166 GOSUB 68'BCAH
168 F=(7+X/100):F$=STR$(F)+"0"'GOAQ
170 IF LEN(F$)<6 THEN F$=F$+"0"'GJYH
172 IF X=0 THEN F$="7.000"+S$'FGMJ
174 PRINT:PRINT'CBHH
176 IF R>13 AND R<18 THEN Y=6'GIVN
178 IF Y<5 THEN C$(R)=C$(R)+D$+"?"
    :R$=S2$+G$+CHR$(119)'KCCW
180 IF Y<3 THEN R$=S2$+E$+CHR$(123)
    'HOWK
182 PRINT N$ S$ L8$ S2$ R8$ S2$
    L8$'BTJJ
184 F1$=B$+"FREQUENCY:"
    :IF R%=1 THEN F1$=E$+"TIME
    TAKEN"'HORU
186 PRINT S$ CHR$(180) S$ F1$ N$
    CHR$(167);'DUDP
188 PRINT TAB(16) G$ CHR$(180)
    "RADAR"G$ CHR$(167);'ESDS
```

```
190 F2$=B$+S$+"CALL SIGN:"
    :IF R%=1 THEN F2$=E$+"R E S U L
    T"'IQSR
192 PRINT TAB(25) N$ CHR$(180) F2$ N$
    CHR$(167):IF R%=0 THEN 198'HCAQ
194 PRINT S$ T$ S2$ CHR$(180) R$
    TAB(22) N$ CHR$(167);'EAJP
196 PRINT TAB(25) CHR$(180) TAB(28)
    YR$ TAB(37) CHR$(167)
    :GOTO 204'HBXT
198 PRINT S$ CHR$(180) F$ S$"MHZ"S$
    CHR$(167);'DTBS
200 PRINT TAB(16) G$ CHR$(180) R$
    TAB(22) G$ CHR$(167);'FXID
202 PRINT TAB(25) N$ CHR$(180)
    TAB(28) C$(R) TAB(37) N$
    CHR$(167)'GDPH
204 PRINT N$ S$ L0$ S2$ R0$ S2$
    L0$'BTKE
206 GOSUB 210:IF R%=1 THEN RETURN'FHPG
208 GOTO 222'BDFF
210 H1$=N$:H$=B$+"TRANSMISSION BEING
    RECEIVED:"+S2$+H1$'FQWL
212 IF K$="I"THEN H$="INTELLIGENCE
    ANALYSIS REVEALS:":H1$=D$'FKRN
214 PRINT:PRINT H1$ L4$'CHWD
216 PRINT S$ CHR$(180) TAB(5) H$
    TAB(37) CHR$(167)'FTAK
218 PRINT S$ CHR$(180) LEFT$(LL$,
    35) TAB(37) CHR$(167)'FXWN
220 PRINT L6$:PRINT U2$;:RETURN'DJQB
222 A%=0:A2$="":Y$="":IF R>13 AND
    R<18 THEN A%=1'JUIK
224 IF R>17 AND R<26 THEN A%=2'GJDI
226 IF Y=1 THEN Y$=Y1$'EHYI
228 IF Y=2 OR Y=3 THEN Y$=Y2$'GJIM
230 A1$=A$(R)+Y$:A1=LEN(A1$)'ESBF
232 IF A1<34 THEN 238'DHPE
234 A2$=RIGHT$(A1$,A1-33)'DNRH
236 A2=LEN(A2$)'CHHH
238 FOR I=1 TO A1+1'EFHK
240 A3$=MID$(A2$,I,1)'CMFD
242 AA$=MID$(A1$,I,33)+A3$'DQGH
244 PRINT TAB(2) AA$ S$ U$'CJTH
246 IF A%=0 THEN 258'DGZJ
248 IF A%=2 THEN 254'DGXL
250 IF I=1 OR I=8 THEN GOSUB 118'GHDG
252 IF A%=1 THEN 260'DGTG
254 IF I=2 OR I=12 THEN GOSUB 114'GISK
256 IF I=20 OR I=36 THEN GOSUB
    114'GJWM
258 IF A%=0 OR Y<4 THEN GOSUB 76'GHYO
260 IF I=1 THEN FOR JJ=1 TO 50'GHTH
262 IF PEEK(203)=49 THEN 490'EKYI
264 IF PEEK(203)<>2 THEN 270'FJJL
266 IF PEEK(653)=1 THEN X=X-1
    :GOTO 124'HNSP
268 IF PEEK(653)=0 THEN X=X+2
    :GOTO 124'HNRR
270 IF I=1 THEN NEXT JJ'EEPG
272 NEXT I'BBCF
274 PRINT:PRINT'CBHI
276 FOR J=1 TO 5:PRINT LL$:NEXT'FIJN
278 FOR J=1 TO 3:PRINT U$;:NEXT'FIYP
280 IF IN<2 THEN 286'DGCH
282 PRINT U$ SPC(8) Z$ E$"TIME FOR A
    DECISION"'CIVO
284 PRINT LL$:GOTO 288'CHKK
286 PRINT N$"PRESS"S$ Z$ W$"R"RF$ N$
    S$"TO REPLAY TRANSMISSION"'BPOW
288 PRINT N$"PRESS"S$ Z$ W$"I"RF$ S$
    Z$ D$ S$"FOR INTELLIGENCE
    ANALYSIS"'BTBA
290 PRINT N$"OR MOVE"S$ Z$
    W$"<-CURSOR->"RF$ N$ S2$"TO
    CHANGE FREQUENCY"'BQMT
292 FOR J=1 TO 10:GET K$:NEXT'FIJL
294 GOSUB 108'BDMK
296 GET K$:IF K$=""THEN FOR J=1 TO 700
    :NEXT:GOTO 294'JPNT
298 IF ASC(K$)=29 OR ASC(K$)=157 THEN
    266'HQWU
300 IF K$="*"THEN 490'DFBA
302 FOR J=1 TO 5:PRINT U$;:NEXT'FIBD
304 FOR J=1 TO 3:PRINT LL$:NEXT'FIHF
306 FOR J=1 TO 4:PRINT U2$;:NEXT'FJAH
308 GOSUB 210:IF K$<>"I"THEN 230'FJLK
310 IF Y>3 THEN 316'DFJB
312 IF IN=0 THEN PRINT TAB(2) Y3$
    :IN=IN+1:PRINT U$:GOTO 318'JVUK
314 IF Y<3 THEN PRINT TAB(2) E$ Y5$
    LP$ N$:IN=IN+1:PRINT U$
    :GOTO 318'JCTN
316 PRINT TAB(2) N$ I$(R)'CJZH
318 PRINT U$;:GOTO 274'CHWI
320 DIM C$(30),A$(30),I$(30)'BUAD
322 S=54272:U$=CHR$(145):U2$=U$+U$
    :CL$=CHR$(147)'HGPM
324 Z$=CHR$(18):RF$=CHR$(146)
    :W$=CHR$(5):D$=CHR$(150)'IESO
326 N$=CHR$(153):B$=CHR$(154)
    :G$=CHR$(155):E$=CHR$(158)'IGMQ
328 RETURN'BAQH
330 S$=CHR$(32):S2$=S$+S$'EOKF
332 FOR J=1 TO 4:P$=P$+CHR$(46)
    :NEXT'HNPJ
334 L1$=CHR$(98)+P$+CHR$(58)+P$'GPUL
336 L2$=S$+CHR$(180)+S2$+L1$+L1$+L1$+
    CHR$(98)+S2$+CHR$(167)'MJNV
338 FOR J=1 TO 35:L3$=L3$+CHR$(183)
    :L5$=L5$+CHR$(175):NEXT'KEEU
340 L4$=S$+CHR$(111)+L3$+CHR$(112)
    'GSVI
342 L6$=S$+CHR$(108)+L5$+CHR$(186)
    'GSRK
344 FOR J=1 TO 11:L7$=L7$+CHR$(183)
    :L9$=L9$+CHR$(175):NEXT'KEOR
346 FOR J=1 TO 5:R7$=R7$+CHR$(183)
    :R9$=R9$+CHR$(175):NEXT'KDST
348 L8$=CHR$(111)+L7$+CHR$(112)'FQVP
350 R8$=G$+CHR$(111)+R7$+CHR$(112)
    +N$'HUHK
352 L0$=CHR$(108)+L9$+CHR$(186)'FQHK
354 R0$=G$+CHR$(108)+R9$+CHR$(186)
    +N$'HUSO
356 FOR J=1 TO 37:LL$=LL$+S$:NEXT'GOCO
```

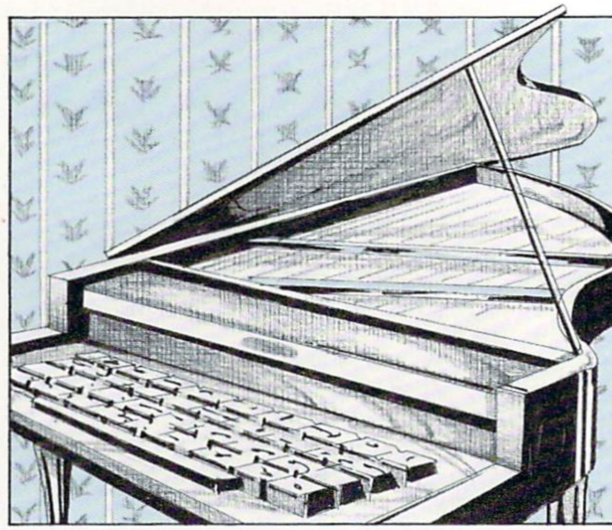
```
358 FOR J=1 TO 39:L$=L$+CHR$(183)
    :NEXT'HPNR
360 RETURN'BAQD
362 FOR J=1 TO 30:READ C$(J):NEXT'FLBK
364 DATA N6NTA,N6GDM,W6NBJ,K2SNO,W4WJ,
    AI6I,N49DT,N5473,XE1FE,DL2SR,
    UR5UW'BNTX
366 DATA NONE,NONE,NONE,NONE,NONE,
    NONE'BEBR
368 DATA WIEN,ROME,PARIS,BBC,WSL,KFI,
    KNX,WNYC,WX-11,WX-12,LAX,CBS-TV,
    WWV'BNKD
370 FOR J=1 TO 30:READ A$(J):NEXT'FLYJ
372 DATA CQ FROM NOVEMBER SIX
    NOVEMBER TANGO ALPHA'BKRQ
374 DATA THIS IS HEMET EMERGENCY
    OPERATIONS CENTER WITH ART ON THE
    MIKE'BCTX
376 DATA PLEASE CLEAR THE FREQUENCY
    FOR EMERGENCY TRAFFIC  QSL?'BVJX
378 DATA" .-.-.[SPACE2]...-.-"'BACO
380 DATA EARTHQUAKE DAMAGE HERE IS
    LIGHT'BCSN
382 DATA" -.-.[SPACE2]--.-[SPACE2]-..
    [SPACE2].[SPACE2].- .. -.... ..
    [SPACE2]-.-"'BAEN
384 DATA MY ETA LAX IS 18 HOURS LOCAL
    TIME'BBYR
386 DATA MAYDAY - FIRE IN LEFT ENGINE
    - REQUEST EMERGENCY CLEARANCE'BYIA
388 DATA MANANA SENORITA'BOWR
390 DATA SPRECHEN SIE DEUTSCH?'BTLM
392 DATA STRASTVICHE TOVARICH'BTAO
394 DATA" ...-[SPACE2]UNIDENTIFIED
    TRANSMISSION"'BAWS
396 DATA" ...-[SPACE2]UNIDENTIFIED
    TRANSMISSION"'BAWU
398 DATA NONE     NONE'BIBQ
400 DATA NONE     NONE'BIBA
402 DATA NONE     NONE'BIBC
404 DATA NONE     NONE'BIBE
406 DATA GUTEN ABEND MEINE DAMEN UND
    HERREN'BEVM
408 DATA AMORE AMORE  A RIVIDERCI'BUBM
410 DATA BON JOUR MADAM ET
    MONSIEUR'BWNG
412 DATA THIS - IS - LONDON'BOWF
414 DATA MUSIC MUSIC'BKHG
416 DATA MUSIC MUSIC'BKHI
418 DATA HERE IS THE NEWS - BUT FIRST
    A COMMERCIAL'BIER
420 DATA THE TEMPERATURE WILL BE IN
    THE LOWER EIGHTIES'BNUL
422 DATA PROBABILITY OF RAIN IS 80%
    TONIGHT'BEAK
424 DATA FROST WARNING FOR ALL
    AREAS'BXHL
426 DATA YOU ARE CLEARED FOR LANDING
    ON RUNWAY 2 WEST'BLKR
428 DATA" ........"'BAXK
430 DATA"THE TIME IS 14:25 UTC"'BACG
432 RETURN'BAQD
434 I$(1)="HAM RADIO STATION"'BFLL
436 FOR J=2 TO 6:I$(J)=I$(1):NEXT'FPON
438 I$(7)="AIRCRAFT TRAFFIC"'BFHP
440 I$(8)=I$(7)'BKGE
442 I$(9)="FOREIGN HAM STATION"'BFBK
444 I$(10)=I$(9):I$(11)=I$(9)'CXCL
446 I$(12)="SWAT TEAM COMMUNICATION"'
    BGYQ
448 I$(13)=I$(12)'BMTM
450 I$(14)="NO RECEPTION ON THIS
    FREQUENCY"'BGJN
452 FOR J=15 TO 17:I$(J)=I$(14)
    :NEXT'FSSL
454 I$(18)="FOREIGN BROADCAST
    STATION"'BGNP
456 FOR J=19 TO 21:I$(J)=I$(18)
    :NEXT'FSVP
458 I$(22)="COMMERCIAL BROADCAST
    STATION"'BGPU
460 FOR J=23 TO 25:I$(J)=I$(22)
    :NEXT'FSPK
462 I$(26)="WEATHER BUREAU"'BGQL
464 I$(27)=I$(26)'BMEK
466 I$(28)="AIRPORT CONTROL
    TOWER"'BGAS
468 I$(29)="TELEVISION STATION"'BGWT
470 I$(30)="FT COLLINS TIME
    SIGNAL"'BGYM
472 Y1$=S2$+"-...[SPACE2]---[SPACE2]
    --[SPACE2]-..."'CGGM
474 Y2$=S2$+"-[SPACE2].[SPACE2].-
    [SPACE2]--"'CGMN
476 Y3$="SUSPICIOUS! - REPEAT
    ANALYSIS ! [BACK ARROW]
    [BACK ARROW]"'BDPV
478 Y5$="POSSIBLE TERRORIST STATION
    !"'BDCW
480 Y6$=W$+"SUCCESS"+S$'DHCL
482 Y7$=G$+"FAILURE"+S$'DHUN
484 Y8$="HELICOPTER WITH SWAT IS TEAM
    TAKING OFF"'BDOW
486 Y9$="SWAT TEAM IS CALLING
    YOU"'BDTT
488 RETURN'BAQO
490 R%=1:PRINT CHR$(19) L$'DKFL
492 FOR J=1 TO 7:PRINT:NEXT'FFYN
494 T$=MID$(TI$,3,2)+S$+"MIN"+S$+RIGH
    T$(TI$,2)+S$+"SEC"'JYIY
496 IF Y>1 THEN POKE 53280,0:YR$=Y7$
    :YB$=Y9$:GOTO 500'HCMX
498 POKE 53280,7:YR$=Y6$:YB$=Y8$'DVBV
500 GOSUB 182'BDOA
502 IF A%=1 THEN PRINT G$ TAB(10)
    A$(14):GOTO 508'GSNI
504 IF Y=1 THEN PRINT W$ Y8$
    :GOSUB 114'FLWI
506 IF Y>1 THEN PRINT TAB(6) G$ Y9$
    :GOSUB 118'GNML
508 PRINT'BACH
510 FOR J=1 TO 7:PRINT LL$ S2$
    :NEXT'FLYF
512 FOR J=1 TO 6:PRINT U$;:NEXT'FICG
514 IF Y=1 THEN 536'DFMH
```

Continued on pg. 102

BY DAVID R. BROOKS

MIDI Programming, *Part 1*

If you've been following the pages of this magazine for the last few months, you know that the Musical Instrument Digital Interface (MIDI) is revolutionizing electronic music. MIDI is a hardware and software standard for communicating with electronic musical instruments under computer control. All you need is a computer, a MIDI interface, one or more MIDI-compatible devices, and some software to control the system.



What you may not know yet is that MIDI instruments are, in some ways, easier to program than the now famous 64 SID chip. Why? Because the SID chip user is responsible for all the instructions required to make a note sound—setting the frequency and waveforms, programming the filters, turning the note on and off, and so on. With a MIDI instrument, sound parameters are often preprogrammed so they can be selected from the keyboard's control panel or with a single MIDI command. If you want your instrument to make sounds, all you have to do is tell it what notes to play.

I don't want to get too carried away about how easy it is to program MIDI instruments; there are substantial difficulties to overcome in a program with two-way MIDI communication. Suppose you want to play a MIDI keyboard and record what you're doing. The keyboard will send information about what keys you are pressing and releasing. This information consists of groups of several bytes sent serially (one after the other) for each key press and release. Within each group, the individual bytes are only about 300 microseconds apart. If you ask your computer to record this incoming stream of bytes, you will find that BASIC programs execute much too slowly to process information arriving at this rate. So, machine-language programs are required to receive MIDI information.

However, BASIC is satisfactory for sending information from your computer to a MIDI instrument. In this case the synthesizer doesn't mind waiting for the bytes required to tell it to do something. I've written a BASIC program called MIDISend that will introduce you to your MIDI interface and allow you to play notes on a synthesizer from your computer keyboard. This may seem a very modest achievement, recalling the early days of toy-keyboard SID programs. Actually, MIDISend could easily be modified to perform a variety of useful control functions for complicated MIDI systems, so the exercise is not entirely academic.

I'm using a Sequential Model 242 interface and a 64 computer. I was in the middle of writing this article in June of 1986 when I learned that Sequential is no longer making the 242 interface under their own brand name. However, the identical product is available as the Model-T interface from Dr. T's Music Software. With other interfaces, the principles are the same, but the addresses for poking information may be different. I've also given some information about the Passport interface.

First of all, it's important to know that your interface will contain an integrated circuit called an asynchronous communications interface adapter (ACIA). This device regulates the passage of information back and forth between your computer and a MIDI device. You can think of it as a small special-purpose computer that can be programmed to perform a limited range of functions. The ACIA contains a status register, a read register, a write register, and a control register. Here's a table of important addresses (given in hex and decimal notation) for the Sequential (Model-T) and Passport interfaces.

	Control	Status	Read	Write
Sequential	#DE00	#DE02	#DE03	#DE01
(Model-T)	56832	56834	56835	56833
Passport	#DE08	#DE08	#DE09	#DE09
	56840	56840	56841	56841

MIDI interfaces typically have several operating modes. For BASIC programs, it's especially important to set the interface in a mode that will not generate interrupts. The values to be loaded into the ACIA control register to initiate particular operating modes for the Sequential and Passport interfaces are as follows.

	Master Reset	No Interrupts	Interrupts (Send)	Interrupts (Receive)	Interrupts (Both)
Passport	$13 (19)	$11 (17)	$31 (49)	$91 (145)	$B1 (177)
Sequential	$03 (3)	$15 (21)	$35 (53)	$95 (149)	$B5 (181)

Now we're ready to proceed. First, reset the interface and poke the appropriate value to turn all interface interrupts off. Next, look at the contents of the ACIA's status register to make sure it's ready to accept information—it should contain a 2 when it's ready. Then poke the value to be sent to a MIDI instrument into the ACIA's send (write) register. The interface will send the byte and automatically reset the status register; we'll still check the value in the status register before trying to send another byte. To send another byte, repeat the whole

process.

Now we need to figure out exactly what information to send. MIDI commands are divided into two categories: system common and system exclusive. Common commands will be recognized by any instrument that adheres to the MIDI standard. This program will be limited to two-system common instructions: note on ("Press a key") and note off ("Release a key"). These two commands should work on all MIDI synthesizers regardless of brand.

Notes in the MIDI standard are identified by numbers from 0 to 127. These values imply a range that exceeds by far the compass of a modern grand piano, so your keyboard won't respond properly to every value. To turn a note on, you must send three bytes: a status byte that tells the instrument how to interpret what follows, the number of the note, and a note velocity. The status byte has a decimal value of 144. A note number of (decimal) 36 is a safe starting value that should work on any conventional keyboard instrument. For instruments that can respond to velocity information, the velocity byte tells the keyboard how loudly you intend the note to be played. Conversely, if you were playing the keyboard and sending MIDI information to your computer, this byte would reflect how hard you hit the key. For non velocity-sensing instruments, a velocity byte value of 64 may be used as a default. Turning a note off is easy: send the same information again, but with a velocity byte value of zero.

One simplification is possible. In the so-called running status mode, you need to send the status byte only once. This locks the instrument into the note on-note off mode so it will properly interpret note number and velocity bytes in groups of two.

A final note: Program MIDISend will work with the 64 and the 128 in either 64 or 128 mode. Part 2 of this article will give some short 64 machine-language routines for reading and displaying data from a MIDI keyboard.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

MIDISend

```
30 POKE 53280,0:POKE 53281,0
   :PRINT CHR$(14):PRINT"[YELLOW]
   "'FVFG
40 DIM KY(90)'BGCB
50 FOR I=1 TO 90:KY(I)=0:NEXT'FMHG
60 FOR I=60 TO 85:READ J:KY(J)=I
   :IF I>72 THEN KY(J)=I-1'KALO
70 NEXT'BAED
80 DATA 90,83,88,68,67,86,71,66,72,78,
   74,77,44'BNNM
90 DATA 81,50,87,51,69,82,53,84,54,89,
   55,85,73'BNDM
100 FLAG=0'BFBV
110 PRINT"[CLEAR]"'BATW
120 PRINT TAB(2)"*******************
    ****************"'CCME
130 PRINT TAB(2)"*[SPACE34]*"'CCTL
140 PRINT TAB(2)"*[SPACE4,SHFT M/
    SHFT I,SHFT D,SHFT I] [SHFT P]
    LAYBACK [SHFT T]EST [SHFT P]
    ROGRAM[SPACE4]*"'CCPM
150 PRINT TAB(2)"*[SPACE15]WITH
    [SPACE15]*"'CCLG
160 PRINT TAB(2)"* [SHFT S]
    EQUENTIAL OR [SHFT P]ASSPORT
    [SHFT I]NTERFACE *"'CCKN
170 PRINT TAB(2)"*[SPACE34]*"'CCTI
180 PRINT TAB(2)"*[SPACE9,SHFT D]
    AVID [SHFT R]. [SHFT B]ROOKS
    [SPACE10]*"'CCJM
190 PRINT TAB(2)"*[SPACE12,SHFT J]
    UNE 1986[SPACE13]*"'CCPL
200 PRINT TAB(2)"*******************
    ****************"'CCMD
210 TX=2:REM TRANSMIT READY FLAG'CVOE
220 VN=64:REM VELOCITY BYTE FOR NOTE
    ON'CBEG
230 VO=0:REM VELOCITY BYTE FOR NOTE
    OFF'CBJH
240 DD=20:REM DELAY TIME'CODF
250 IF FLAG<>0 THEN 360'EIUF
260 PRINT:PRINT TAB(10)"[SHFT W]
    HICH INTERFACE?"'DENJ
270 PRINT TAB(10)"[RVS,SHFT S,RVOFF]
    EQUENTIAL"'CDOI
280 PRINT TAB(10)"[RVS,SHFT P,RVOFF]
    ASSPORT"'CDKJ
290 GET Z$:IF Z$=""THEN 290'EIKJ
300 IF Z$="S"THEN GOSUB 1060
    :GOTO 350'FKAC
310 IF Z$="P"THEN GOSUB 1120
    :GOTO 350'FKTD
320 IF Z$="[SHFT S]"THEN GOSUB 1060
    :GOTO 350'FKDE
330 IF Z$="[SHFT P]"THEN GOSUB 1120
    :GOTO 350'FKWF
340 GOTO 110'BDBC
350 FLAG=1'BFCD
360 PRINT'BACD
370 PRINT TAB(10)"[RVS]1[RVOFF]
    - PLAY SCALE"'CDJJ
380 PRINT TAB(10)"[RVS]2[RVOFF]
    - PLAY NOTES FROM KEYBOARD"'CDVO
390 PRINT TAB(10)"[RVS]3[RVOFF]
    - CHANGE PROGRAM"'CDWM
400 PRINT TAB(10)"[RVS]4[RVOFF]
    - END PROGRAM"'CDNE
410 PRINT:PRINT"[SHFT S]
    ELECT ONE..."'CBRE
420 GET J$:IF J$=""THEN 420'EIXE
430 J=VAL(J$):IF J<1 THEN 110'FLVG
440 IF J>4 THEN 110'DFRE
450 ON J GOTO 470,720,620,1040'CRUH
460 REM *** PLAY ASCENDING SCALE'BVEK
470 WAIT SR,TX:REM READY TO
    TRANSMIT?'CWKM
480 POKE TR,144:REM IF SO,
    SEND STATUS BYTE FOR NOTE
    ON/NOTE OFF'CSYT
```

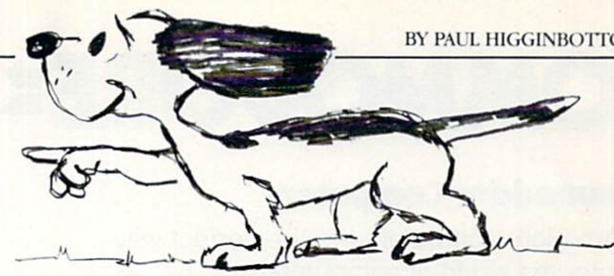
```
490 FOR N=6Ø TO 88'DFAJ
5ØØ WAIT SR,TX'BFPB
51Ø POKE TR,N:REM SEND NOTE
    NUMBER'CTSG
52Ø WAIT SR,TX'BFPD
53Ø POKE TR,VN:REM SEND VELOCITY
    BYTE'CWMJ
54Ø FOR K=1 TO DD:NEXT:REM DO-NOTHING
    DELAY LOOP'FAXM
55Ø WAIT SR,TX'BFPG
56Ø POKE TR,N:REM SEND NOTE
    NUMBER'CTSL
57Ø WAIT SR,TX'BFPI
58Ø POKE TR,VO:REM SEND Ø BYTE FOR
    NOTE OFF'CARP
59Ø FOR K=1 TO 1Ø:NEXT:REM DO-NOTHING
    BREAK BETWEEN NOTES'FIIU
6ØØ NEXT'BAEA
61Ø GOTO 11Ø'BDBC
62Ø PRINT"[CLEAR,SHFT S]
    END PROGRAM CHANGES...":PRINT'CBDK
63Ø WAIT SR,TX:REM READY TO
    TRANSMIT?'CWKK
64Ø POKE TR,192:REM PROGRAM CHANGE
    STATUS BYTE'CFNN
65Ø INPUT"[SHFT P]ROGRAM NUMBER";
    PN'BDKK
66Ø WAIT SR,TX'BFPI
67Ø POKE TR,PN'BFHJ
68Ø PRINT"[SHFT A]GAIN (Y/N)?"'BAKM
69Ø GET J$:IF J$=""THEN 69Ø'EIHN
7ØØ IF J$="Y"THEN 62Ø'DFRE
71Ø GOTO 11Ø'BDBD
72Ø PRINT"[CLEAR]PLAY FROM
    KEYBOARD..."'BAVJ
73Ø PRINT CHR$(142)'CFVG
74Ø PRINT"[SPACE2]2 3[SPACE3]
    4 5 6"'BALH
75Ø PRINT" Q W E R T Y U I"'BARK
76Ø PRINT"[CMDR M,RVS] [RVOFF] [RVS]
    [RVOFF] [RVS] [SHFT B] [RVOFF]
    [RVS] [RVOFF] [RVS] [RVOFF] [RVS]
     [SHFT B] [RVOFF,CMDR G]"'BAJP
77Ø PRINT"[CMDR M,RVS] [RVOFF] [RVS]
    [RVOFF] [RVS] [SHFT B] [RVOFF]
    [RVS] [RVOFF] [RVS] [RVOFF] [RVS]
     [SHFT B] [RVOFF,CMDR G]"'BAJQ
78Ø PRINT"[CMDR M,RVS] [RVOFF] [RVS]
    [RVOFF] [RVS] [SHFT B] [RVOFF]
    [RVS] [RVOFF] [RVS] [RVOFF] [RVS]
     [SHFT B] [RVOFF,CMDR G]
     (UPPER OCTAVE)"'BAOV
79Ø PRINT"[CMDR M,RVS] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B] [RVOFF,
    CMDR G]"'BAYS
8ØØ PRINT"[CMDR M,RVS] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B] [RVOFF,
    CMDR G]"'BAYK
81Ø PRINT:'BBKD
82Ø PRINT"[SPACE2]S D[SPACE3]
    G H J"'BAOH
83Ø PRINT" Z X C V B N M ,"'BATI
84Ø PRINT"[CMDR M,RVS] [RVOFF] [RVS]
    [RVOFF] [RVS] [SHFT B] [RVOFF]
    [RVS] [RVOFF] [RVS] [RVOFF] [RVS]
     [SHFT B] [RVOFF,CMDR G]"'BAJO
85Ø PRINT"[CMDR M,RVS] [RVOFF] [RVS]
    [RVOFF] [RVS] [SHFT B] [RVOFF]
    [RVS] [RVOFF] [RVS] [RVOFF] [RVS]
     [SHFT B] [RVOFF,CMDR G]"'BAJP
86Ø PRINT"[CMDR M,RVS] [RVOFF] [RVS]
    [RVOFF] [RVS] [SHFT B] [RVOFF]
    [RVS] [RVOFF] [RVS] [RVOFF] [RVS]
     [SHFT B] [RVOFF,CMDR G]
     (LOWER OCTAVE)"'BALU
87Ø PRINT"[CMDR M,RVS] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B] [RVOFF,
    CMDR G]"'BAYR
88Ø PRINT"[CMDR M,RVS] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B] [RVOFF,
    CMDR G]"'BAYS
89Ø PRINT:PRINT"PRESS SPACEBAR TO
    QUIT..."'CBGT
9ØØ WAIT SR,TX'BFPF
91Ø POKE TR,144'BGCG
92Ø GET K$:IF K$=""THEN 92Ø'EIFJ
93Ø IF ASC(K$)=32 THEN PRINT CHR$(14)
    :GOTO 11Ø'HOHN
94Ø WAIT SR,TX'BFPJ
95Ø POKE TR,KY(ASC(K$))'CLCL
96Ø WAIT SR,TX'BFPL
97Ø POKE TR,VN'BFNM
98Ø FOR I=1 TO DD:NEXT'EFXO
99Ø WAIT SR,TX'BFPO
1ØØØ POKE TR,KY(ASC(K$))'CLCV
1Ø1Ø WAIT SR,TX'BFPV
1Ø2Ø POKE TR,VO'BFOW
1Ø3Ø GOTO 92Ø'BDKW
1Ø4Ø PRINT:PRINT"[SHFT E]
     ND PROGRAM...":STOP'DCQD
1Ø5Ø REM *** SEQUENTIAL
     INITIALIZATION'BCWG
1Ø6Ø CR=56832:REM ACIA CONTROL
     REGISTER'CCVH
1Ø7Ø TR=CR+1:SR=CR+2:REM TRANSMIT AND
     STATUS REGISTERS'FNPO
1Ø8Ø POKE CR,3:REM ACIA MASTER
     RESET'CUBH
1Ø9Ø POKE CR,21:REM DISABLE ACIA
     INTERRUPT'CBHK
11ØØ RETURN'BAQT
111Ø REM *** PASSPORT INITIALIZATION'
     BABC
112Ø CR=5684Ø:REM ACIA CONTROL
     REGISTER'CCUE
113Ø TR=CR+1:SR=CR:REM TRANSMIT AND
     STATUS REGISTERS'EMBK
114Ø POKE CR,19:REM ACIA MASTER
     RESET'CVGE
115Ø POKE CR,17:REM DISABLE ACIA
     INTERRUPT'CBMH
116Ø RETURN'BAQA
```

END

BY PAUL HIGGINBOTTOM

C Tutorial,
Part 5

Having dealt with the flow control aspects of C, we can move on to the exciting world of pointers.


BOB CLARK

If you can remember and keep referring to these definitions, you will have less trouble understanding the concept of pointers.

1. A pointer variable contains the memory address of (points to) an object of some variable type.
2. A pointer variable's value or the value of the object type to which it points can be tested, used in a calculation or modified.

Defining a pointer is very similar to everything you've seen, so there are only a few new items of syntax you need to learn.

To give you a frame of reference about pointers, you might have noticed that nowhere in C is there any means of manipulating strings of characters directly as in BASIC. You're quite right, too, but strings can be thought of as arrays of characters and pointers into such arrays hold the key to string manipulation in C.

To define, for example, a pointer to a character, you use

char *charpointer;

The only difference then from defining "charpointer" as a variable which contains a character rather than a pointer to a character (above) is the asterisk (*) before the name.

The compiler knows after the definition that charpointer contains an address (and it will therefore be physically large enough to hold any valid memory address for the machine it is running on) and the address it holds points to memory which will be treated like a variable of type char.
ed like a variable of type char.

The wording of this last paragraph was careful because the compiler must know, you see, what type of object the variable points to because different types of variables occupy different amounts of memory. If this pointer concept is to allow programs to change the pointer's value to point to the next object the compiler must know how big the object is to which it is pointing in order to know how much to advance the pointer by.

This last explanation might shed some light onto the capability of pointers. If strings can be thought of as arrays of chars, and a pointer variable can point into that array and be advanced forward and backward through that array, we could do a whole myriad of different things... hmmm...

Enough theory! An example, please.

```
main()
{
 int i;
 int *intptr;

 i = 3;   /* give i a value */
 intptr = &i; /* put the address of i into intptr */
 printf("i = %d\n", i);
 printf("intptr points to the value %d\n", *intptr);
}
```

The purpose of this example is to introduce you to the syntax of pointers.

First the definition—as was mentioned before, putting an asterisk before the name of the variable name declares it as a pointer to memory holding a value of the type specified.

Next, giving a pointer a value—intptr's value upon being declared in the example is meaningless. It has not been assigned a memory address which it is known holds the an int. The ampersand (&) operator returns the memory address of a variable. So the example shows intptr being given the value of the address of the int variable i.

Last but not least, is referencing the data the pointer points to. The value

intptr

is the contents of intptr, the memory address. The value

*intptr

is the int contained in the memory whose address is contained in intptr.

Array Names Are Really Just Pointers

Arrays in C can be thought of as special kinds of pointers. The array name behaves like a pointer whose value is fixed.

When an element of an array is referenced, the program is actually just taking the subscript, multiplying that by the size of the objects in the array, and adding that to the address of the start of the array to form a pointer to that element.

If an array of ints is declared as follows:

int nums[10];

Referencing nums without a subscript actually gets the address of the start of the array. So we can assign a pointer to an int with the address of the start of the nums array by

```
int nums[10];
int *ptr;
ptr = nums; /* ptr now points to the start of the nums array or
               rather, the first element of the nums array.
               */
```

Pointers Behave Just Like Other Variables

Like other variables, pointers can be added and subtracted, but the meaning of adding constants or incrementing/decrementing pointers is a little more subtle.

When we add 1 to a pointer, we don't increase the memory address contents of the pointer by 1 (byte, word, or whatever), we increase it by the size of the object to which it points. Thus, taking our ptr example above

```
ptr = nums;
++ptr; /*ptr now points to the second element of the array */
```

The latter statement could have been written:

ptr += 1;

To set ptr to the address of any element of the ptr array, say,

the xth element, you can use either

ptr = &nums[x];
or
ptr = nums + j;

Each is perfectly valid, although I think the first one is a little more obvious.

Since strings can be thought of as arrays of characters and pointers can be used to reference and manipulate arrays, let's look at a simple string copying routine.

One note—when literal strings are used, what the compiler actually uses as the string's value is the address of its first character—yes, it treats it just like an array! But you cannot, unfortunately, do the following:

char bigstring[256];
bigstring = "hello";

One might think that this would put a copy of string "hello" into the array of chars bigstring. No such luck, C cannot manipulate strings as a whole. The above actually is trying to assign bigstring (as if it were a pointer to a char that could change) to the address of the start of the literal "hello." Bigstring is a pointer internally, but as I mentioned before, because it's an array you can't re-assign it.

Also, literal strings have one character after the last visible character in the string to indicate its end. That extra character is a nul (ASCII 0), that is,

"hello."

Is actually:

'h', 'e', 'l', 'l', 'o', '.', '/0' in memory.

Because of this, a program can know if a pointer is pointing to the end of a string because it is pointing at a nul '/0').

```
main()
{
 extern void strcpy();

 char bigstring[256]; /* that should be big enough */

 strcpy(bigstring, "hello world.");
 printf("%s\n", bigstring);
}

void strcpy(to, from)
char *to, *from;
{
 while (*from != '\0') { /* while there are more characters in the string */
  *to = *from;  /* copy it */
  ++to;     /* advance both pointers to the next char */
  ++from;
 }
 *to = '\0';    /* terminate the destination string */
}
```

What is "void" you may ask? That's simply a function type that doesn't return any value; like a subroutine, or procedure.

The comments in the routine should be fairly self-explanatory.

The only new thing is in the printf(), where another new format specification has appeared.

%s

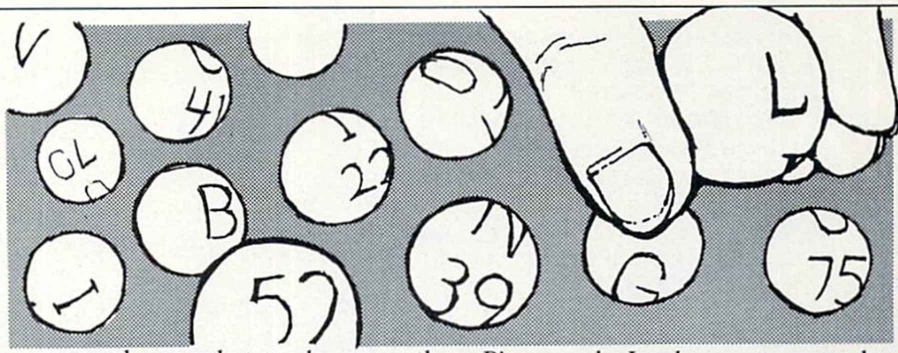
This expects a string address as an argument and will print it at that place in the format. Thus, the format string in the program will just print bigstring and advance to a new line.

We have covered a lot of ground. Your mission is to write a better strcpy() function. Also, for practice, you could try writing strncpy() which will copy only a specified number of characters from one string to another. ■

BY RICHARD RAGER

Bingo Simulator

for the Commodore 64



Susan Lippman

Bingo Simulator has two options: play a game of Bingo or print out cards for the game. The first option displays the master board which shows all the numbers. At the top of the screen it shows the number being called. The bottom of the screen shows what to do: press the spacebar to continue or quit. Pressing the spacebar will pick another number. When someone calls "Bingo!" and presses Q, the quit message appears.

The second option prints out the Bingo cards. It asks you to enter how many cards you want. The printer prints four on a page. When it is printing, you may press F1 to stop; this will close the printer file and take you back to the options screen.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Bingo Simulator

```
10 POKE 53280,0:POKE 53281,0'CPLB
20 PRINT"[CLEAR]"'BATY
30 PRINT CHR$(14)CHR$(8);'DIKC
40 PRINT"[WHITE,CMDR A,SHFT *37,
   CMDR S]"'BABE
50 PRINT "[WHITE,SHFT -,SPACE7,CYAN,
   SHFT C]REATED BY: [YELLOW,SHFT R]
   ICHARD [SHFT R]AGER[SPACE5,WHITE,
   SHFT -]"'BADO
60 PRINT"[WHITE,CMDR Z,SHFT *37,
   CMDR X]"'BANG
70 PRINT'BACD
80 PRINT TAB(6)"[WHITE]1.) [BLUE,
   SHFT P]LAY [SHFT B].[SHFT I].
   [SHFT N].[SHFT G].[SHFT O].[DOWN]
   "'CCBN
90 PRINT TAB(6)"[WHITE]2.) [BLUE,
   SHFT P]RINT CARD[DOWN]"'CCDK
100 PRINT "[YELLOW,SHFT E]
    NTER YOUR CHOICE: ";'BBVC
110 POKE 646,C:PRINT"[HOME]";TAB(9);"
    [SHFT B].[SHFT I].[SHFT N].
    [SHFT G].[SHFT O]. [SHFT S]
    IMULATOR"'DKDI
120 GET A$:IF A$<"0"OR A$>"3"OR
    A$=""THEN C=C+1'KMRG
130 FOR A=1 TO 100:NEXT A'EHOB
140 IF C=15 THEN C=1:GOTO 110'FJIE
150 IF A$="1"THEN 180'DFUD
160 IF A$="2"THEN 670'DFZE
170 GOTO 110'BDBD
180 REM PLAY GAME'BIWF
190 PRINT "[CLEAR,GREEN]";'BBIF
200 PRINT TAB(15)"[CMDR A,SHFT *6,
    CMDR S]"'CDBD
210 PRINT TAB(15)"[SHFT -,SPACE6,
    SHFT -]"'CDUB
220 PRINT TAB(15)"[CMDR Z,SHFT *6,
    CMDR X]"'CDNF
230 PRINT"[RED,CMDR A,SHFT *4,CMDR R,
    SHFT *4,CMDR R,SHFT *4,CMDR R,
    SHFT *4,CMDR R,SHFT *4,CMDR R,
    SHFT *4,CMDR R,SHFT *4,CMDR R,
    SHFT *3,CMDR S]";'BBWE
240 FOR A=1 TO 9'DDEC
250 PRINT"[SHFT -,SPACE4,SHFT -,
    SPACE4,SHFT -,SPACE4,SHFT -,
    SPACE4,SHFT -,SPACE4,SHFT -,
    SPACE4,SHFT -,SPACE4,SHFT -,
    SPACE3,SHFT -]";'BBEN
260 PRINT"[CMDR Q,SHFT *4,SHFT +,
    SHFT *4,SHFT +,SHFT *4,SHFT +,
    SHFT *4,SHFT +,SHFT *4,SHFT +,
    SHFT *4,SHFT +,SHFT *4,SHFT +,
    SHFT *3,CMDR W]";'BBAI
270 NEXT A'BBTD
280 PRINT"[SHFT -,SPACE4,SHFT -,
    SPACE4,SHFT -,SPACE4,SHFT -,
    SPACE4,SHFT -,SPACE4,SHFT -,
    SPACE4,SHFT -,SPACE4,SHFT -,
    SPACE3,SHFT -]";'BBEQ
290 PRINT"[CMDR Z,SHFT *4,CMDR E,
    SHFT *4,CMDR E,SHFT *4,CMDR E,
    SHFT *4,CMDR E,SHFT *4,CMDR E,
    SHFT *4,CMDR E,SHFT *4,CMDR E,
    SHFT *3,CMDR X]";'BBYK
300 PRINT"[HOME2,DOWN4,RIGHT2,YELLOW,
    SHFT B]";'BBRY
310 PRINT"[BLUE,RIGHT4]01[RIGHT3]02
    [RIGHT3]03[RIGHT3]04[RIGHT3]05
    [RIGHT3]06[RIGHT3]07"'BAAE
320 PRINT"[DOWN,RIGHT2]08[RIGHT3]09
    [RIGHT3]10[RIGHT3]11[RIGHT3]12
    [RIGHT3]13[RIGHT3]14[RIGHT3]
    15"'BAWF
330 PRINT"[DOWN,RIGHT2,YELLOW,SHFT I,
    BLUE,RIGHT4]16[RIGHT3]17[RIGHT3]
    18[RIGHT3]19[RIGHT3]20[RIGHT3]21
    [RIGHT3]22"'BATH
340 PRINT"[DOWN,RIGHT2]23[RIGHT3]24
    [RIGHT3]25[RIGHT3]26[RIGHT3]27
    [RIGHT3]28[RIGHT3]29[RIGHT3]
    30"'BASH
350 PRINT"[DOWN,RIGHT2,YELLOW,SHFT N,
```

```
    BLUE,RIGHT4]31[RIGHT3]32[RIGHT3]
    33[RIGHT3]34[RIGHT3]35[RIGHT3]36
    [RIGHT3]37"'BAFJ
360 PRINT"[DOWN,RIGHT2]38[RIGHT3]39
    [RIGHT3]40[RIGHT3]41[RIGHT3]42
    [RIGHT3]43[RIGHT3]44[RIGHT3]
    45"'BAVJ
370 PRINT"[DOWN,RIGHT2,YELLOW,SHFT G,
    BLUE,RIGHT4]46[RIGHT3]47[RIGHT3]
    48[RIGHT3]49[RIGHT3]50[RIGHT3]51
    [RIGHT3]52"'BANL
380 PRINT"[DOWN,RIGHT2]53[RIGHT3]54
    [RIGHT3]55[RIGHT3]56[RIGHT3]57
    [RIGHT3]58[RIGHT3]59[RIGHT3]
    60"'BARL
390 PRINT"[DOWN,RIGHT2,YELLOW,SHFT O,
    BLUE,RIGHT4]61[RIGHT3]62[RIGHT3]
    63[RIGHT3]64[RIGHT3]65[RIGHT3]66
    [RIGHT3]67"'BACN
400 PRINT"[DOWN,RIGHT2]68[RIGHT3]69
    [RIGHT3]70[RIGHT3]71[RIGHT3]72
    [RIGHT3]73[RIGHT3]74[RIGHT3]
    75"'BAUE
410 PRINT TAB(5)"[DOWN,SHFT P]RESS
    [RED,SHFT S,SHFT P,SHFT A,SHFT C,
    SHFT E] [SHFT B,SHFT A,SHFT R]
    [BLUE]FOR NEXT NUMBER.";'CDUO
420 PRINT"[HOME,DOWN,GREEN]"TAB(17)"
    [SPACE4]"'CDRC
430 B$(1)="[SHFT B]":B$(2)="[SHFT I]"
    :B$(3)="[SHFT N]"'DRKI
440 B$(4)="[SHFT G]":B$(5)="[SHFT O]
    "'CLNH
450 LC=INT(RND(0)*5)+1'FJMI
460 NC=INT(RND(0)*15)+1'FKNJ
470 NN=NC+((LC-1)*15)'ENRK
480 SC=55463'BHDI
490 SS=SC+((LC-1)*160)+((NC-1)*5)+(
    (NC>7)*-40)'LGCV
500 IF SS>56295 THEN END'EHUD
510 IF(PEEK(SS)AND 15)=15 THEN
    450'FNCG
520 POKE SS,15:POKE SS+1,15'DMDF
530 PRINT"[HOME,DOWN,GREEN]
    "TAB(17)B$(LC)NN'CLPF
540 GET A$'BCGE
550 IF A$=CHR$(32)THEN 420'EJQI
560 IF A$="Q"THEN GOSUB 580'EFVI
570 GOTO 540'BDIH
580 REM END OR NO'BHNJ
590 PRINT"[HOME,DOWN24,SPACE37]";'BBFP
600 PRINT"[LEFT37,RED,SHFT A]RE
    [SHFT Y]OU [SHFT S]URE (Y/N).";
    'BBFF
610 GET A$:IF A$="Y"THEN RUN'FFIF
620 IF A$<>"N"THEN 610'EFYF
630 PRINT"[HOME,DOWN24,SPACE35]";'BBWJ
640 PRINT"[LEFT35]";'BBJB
650 PRINT"[SPACE5,BLUE,SHFT P]RESS
    [RED,SHFT S,SHFT P,SHFT A,SHFT C,
    SHFT E,SHFT SPACE,SHFT B,SHFT A,
    SHFT R,BLUE,SHFT SPACE]FOR NEXT
    [SHFT SPACE]NUMBER.";'BBSV
660 RETURN'BAQG
670 REM PRINT CARDS'BKLK
680 PRINT CHR$(14)CHR$(8)"[CLEAR]";
    TAB(9);"[BLUE,SHFT B].[SHFT I].
    [SHFT N].[SHFT G].[SHFT O].
    [SHFT S]IMULATOR"'ELTV
690 PRINT"[WHITE,CMDR A,SHFT *37,
    CMDR S]"'BABN
700 PRINT "[WHITE,SHFT -,SPACE7,CYAN,
    SHFT C]REATED BY: [YELLOW,SHFT R]
    ICHARD [SHFT R]AGER[SPACE5,WHITE,
    SHFT -]"'BADO
710 PRINT"[WHITE,CMDR Z,SHFT *37,
    CMDR X]"'BANG
720 PRINT'BACD
730 PRINT"[SHFT E]NTER HOW MANY CARD
    YOU WISH TO MAKE."'BAXO
740 INPUT CC'BCLG
750 PRINT'BACG
760 PRINT"[GREEN,SHFT P]
    LEASE MAKE SURE PRINTER IS READY."
    :PRINT'CBOS
770 PRINT"[SHFT T]HEN PRESS [RED,
    SHFT R,SHFT E,SHFT T,SHFT U,
    SHFT R,SHFT N]."'BADR
780 GET A$:IF A$<>CHR$(13)THEN
    780'GMKP
790 PRINT"[UP6]";'BBNO
800 FOR A=1 TO 6'DDBE
810 PRINT"[SPACE39]"'BAUI
820 NEXT:PRINT"[UP7,GREEN]"'CBMJ
830 GOSUB 1600:OPEN 4,4'CIRH
840 FOR NC=1 TO CC'DFFJ
850 PRINT"[HOME,DOWN6,BLUE]"'BAXI
860 PRINT TAB(7)"[CMDR A,SHFT *4,
    CMDR R,SHFT *4,CMDR R,SHFT *4,
    CMDR R,SHFT *4,CMDR R,SHFT *4,
    CMDR S]"'CCTD
870 PRINT TAB(7)"[SHFT -] [SHFT B,
    SPACE2,SHFT -] [SHFT I,SPACE2,
    SHFT -] [SHFT N,SPACE2,SHFT -]
    [SHFT G,SPACE2,SHFT -] [SHFT O,
    SPACE2,SHFT -]"'CCNV
880 PRINT TAB(7)"[CMDR Q,SHFT *4,
    SHFT +,SHFT *4,SHFT +,SHFT *4,
    SHFT +,SHFT *4,SHFT +,SHFT *4,
    CMDR W]"'CCCG
890 FOR A=1 TO 4'DDYN
900 PRINT TAB(7)"[SHFT -,SPACE4,
    SHFT -,SPACE4,SHFT -,SPACE4,
    SHFT -,SPACE4,SHFT -,SPACE4,
    SHFT -]"'CCEM
910 PRINT TAB(7)"[CMDR Q,SHFT *4,
    SHFT +,SHFT *4,SHFT +,SHFT *4,
    SHFT +,SHFT *4,SHFT +,SHFT *4,
    CMDR W]"'CCCA
920 NEXT A'BBTF
930 PRINT TAB(7)"[SHFT -,SPACE4,
    SHFT -,SPACE4,SHFT -,SPACE4,
```

```
    SHFT -,SPACE4,SHFT -,SPACE4,
    SHFT -]"'CCEP
940 PRINT TAB(7)"[CMDR Z,SHFT *4,
    CMDR E,SHFT *4,CMDR E,SHFT *4,
    CMDR E,SHFT *4,CMDR E,SHFT *4,
    CMDR X]"'CCCC
950 FOR A=1 TO 5:B(A)=0'EJJM
960 B=INT(RND(0)*15)+1'FJJO
970 FOR AA=1 TO A:IF B(AA)=B GOTO
    960'GORQ
980 NEXT AA'BCEM
990 B(A)=B:NEXT A'CHVO
1000 FOR A=1 TO 5:I(A)=0'EJQW
1010 I=INT(RND(0)*15)+16'FKUY
1020 FOR AA=1 TO A:IF I(AA)=I GOTO
     1010'GPQB
1030 NEXT AA'BCEW
1040 I(A)=I:NEXT A'CHKY
1050 FOR A=1 TO 5:N(A)=0'EJVC
1060 N=INT(RND(0)*15)+31'FKWE
1070 FOR AA=1 TO A:IF N(AA)=N GOTO
     1060'GPBH
1080 NEXT AA'BCEC
1090 N(A)=N:NEXT A'CHUE
1100 FOR A=1 TO 5:G(A)=0'EJOX
1110 G=INT(RND(0)*15)+46'FKVA
1120 FOR AA=1 TO A:IF G(AA)=G GOTO
     1110'GPNC
1130 NEXT AA'BCEX
1140 G(A)=G:NEXT A'CHGA
1150 FOR A=1 TO 5:O(A)=0'EJWD
1160 O=INT(RND(0)*15)+61'FKBF
1170 FOR AA=1 TO A:IF O(AA)=O GOTO
     1160'GPEI
1180 NEXT AA'BCED
1190 O(A)=O:NEXT A'CHWF
1200 PRINT"[HOME,DOWN10]";'BBTV
1210 FOR A=1 TO 5'DDAX
1220 IF A=3 THEN PRINT TAB(8)B(A)"
     [RIGHT]"TAB(13)I(A)"[RIGHT]FREE
     [RIGHT]"G(A)"[RIGHT]"O(A)SPC(13);
     'HCYI
1225 IF A=3 THEN GOTO 1240'EGRF
1230 PRINT TAB(8)B(A)"[RIGHT]
     "TAB(13)I(A)"[RIGHT]"N(A)"[RIGHT]
     "G(A)"[RIGHT]"O(A)SPC(13);'EEWG
1240 PRINT:NEXT A'CCYA
1250 DW$=CHR$(14):SW$=CHR$(15)'EPMG
1260 GR$=CHR$(8)'CGPD
1270 C$(2)=DW$+"[SHFT -] B[SPACE2,
     SHFT -] I[SPACE2,SHFT -] N
     [SPACE2,SHFT -] G[SPACE2,SHFT -]
      O[SPACE2,SHFT -]"+GR$'DLSO
1280 C$(1)=DW$+"[CMDR A,SHFT *4,
     CMDR R,SHFT *4,CMDR R,SHFT *4,
     CMDR R,SHFT *4,CMDR R,SHFT *4,
     CMDR S]"+GR$'DLUB
1290 C$(3)=DW$+"[CMDR Q,SHFT *4,
     SHFT +,SHFT *4,SHFT +,SHFT *4,
     SHFT +,SHFT *4,SHFT +,SHFT *4,
     CMDR W]"+GR$'DLFD
1300 C$(4)=DW$+"[SHFT -,SPACE4,SHFT -,
     SPACE4,SHFT -,SPACE4,SHFT -,
     SPACE4,SHFT -,SPACE4,SHFT -]
     "+GR$'DLII
1310 C$(5)=DW$+"[CMDR Z,SHFT *4,
     CMDR E,SHFT *4,CMDR E,SHFT *4,
     CMDR E,SHFT *4,CMDR E,SHFT *4,
     CMDR X]"+GR$'DLHU
1320 FOR A=1 TO 3'DDXA
1330 PRINT#4,C$(A):GOSUB 1600
     :NEXT A'DOXD
1340 FOR A=1 TO 4:GOSUB 1600'EILE
1350 PRINT#4,C$(4):GOSUB 1600'CMNE
1360 PRINT#4,DW$"[SHFT -]";
     :IF B(A)<10 THEN PRINT#4," ";
     'FQSJ
1370 PRINT#4,B(A);'BHHF
1380 PRINT#4,"[SHFT -]"I(A);'BHKG
1390 IF A=3 THEN PRINT#4,"[SHFT -]
     "SW$"[SPACE2]FREE[SPACE2]"DW$;
     :GOTO 1410'FQLO
1400 PRINT#4,"[SHFT -]"N(A);'BHPY
1410 PRINT#4,"[SHFT -]"G(A);'BHIA
1420 PRINT#4,"[SHFT -]"O(A)"[SHFT -]
     "GR$'BJGD
1430 PRINT#4,C$(4):GOSUB 1600'CMND
1440 PRINT#4,C$(3):GOSUB 1600'CMME
1450 NEXT A'BBTC
1460 PRINT#4,C$(4):GOSUB 1600'CMNG
1470 PRINT#4,DW$"[SHFT -]";
     :IF B(A)<10 THEN PRINT#4," ";
     'FQSL
1480 PRINT#4,B(5);'BHAG
1490 PRINT#4,"[SHFT -]"I(5);'BHXI
1500 PRINT#4,"[SHFT -]"N(5);'BHDA
1510 PRINT#4,"[SHFT -]"G(5);'BHVB
1520 PRINT#4,"[SHFT -]"O(5)"[SHFT -]
     "GR$:GOSUB 1600'COLF
1530 PRINT#4,C$(4):GOSUB 1600'CMNE
1540 PRINT#4,C$(5):GOSUB 1600'CMOF
1550 PRINT#4'BBDD
1560 IF NC/4=INT(NC/4)THEN PRINT#4,
     CHR$(8)CHR$(13)CHR$(13)'KVOP
1570 GOSUB 1600:NEXT NC'CHKH
1580 PRINT"[SHFT D]ONE.":CLOSE 4'CCCJ
1590 FOR A=1 TO 2000:NEXT:RUN'FINL
1600 REM DO SOME THING'BLHC
1610 PRINT"[HOME,DOWN5]"TAB(16)"
     [SHFT P]RINTING"'CDNF
1620 PRINT TAB(7)"[SHFT N]
     UMBER LEFT TO PRINT
     : ";RIGHT$("0"+MID$(STR$(CC-NC),
     2),2)'HRIP
1630 CO=CO+1:IF CO=15 THEN CO=1'GNJJ
1640 POKE 646,CO'BGTE
1650 GET A$:IF A$="[F1]"THEN PRINT#4
     :CLOSE 4:RUN'HJWK
1660 RETURN'BAQF
```

END

BY JONATHAN RODDA

Autorun

for the Commodore 64

Have you ever wanted to load your programs and have them run automatically like professional software packages? With Autorun, you can. Autorun loads and executes BASIC or machine-language programs. And it is compatible with most hardware and software utilities that speed up the disk drive.

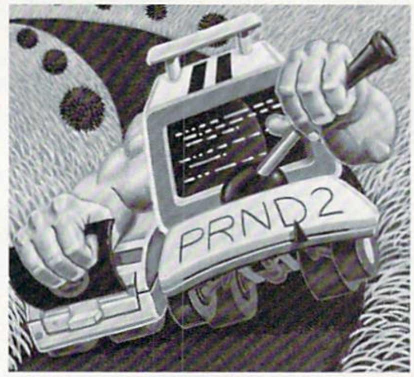
Autorun creates a short 92-byte machine-language boot program which automatically loads and runs your specified program. Type LOAD "FILENAME",8,1 and your program will be running! Autorun is helpful to those who have a lot of programs in machine language. Since Autorun automatically loads and executes your programs, it is unnecessary to memorize those long start address numbers.

Type in the BASIC program at the end of this article and be sure to type the DATA statements correctly, as they contain two machine-language programs. Be sure to save a copy of Autorun before running it.

To use Autorun, just load and run it. There is a brief pause while the data is being poked into memory, then the menu appears with five options: Create Autorun Boot, View Directory, Send Disk Command, Change Device Number, and Exit to BASIC.

To Autorun a program, select option one. The prompt "Enter name of file to Autorun:" will appear. Type in the name of the program you want to run automatically. The filename can be any valid name up to 16 characters. The wild card symbols can be used. For example, Autorun will accept the filename "SPACE*" or "?PACEGAME" for the file SPACEGAME.

The next prompt is "Is the program in (B)ASIC or (M)achine Language?" Enter either B for BASIC or M for machine language, depending on the type of program that you want to Autorun. If you select M, the computer asks for the start address of your program. This is the number that you SYS to start the program; it can be from 0 to 65535. Enter the start address in decimal.



ED SAUK

Autorun loads and executes BASIC or machine-language programs.

The computer then displays the prompt "Blank screen during load?" Select either Y for yes or N for no. If you select Y, the computer screen turns blank (the border color) while the program is loading. Blanking the screen speeds up the computer by approximately 15%. If you select N, the computer will display the usual searching and loading messages.

The next prompt asks for the name of the boot file. The boot file is a one-block program you load which in turn will auto-run your program. You may use any valid filename up to 16 characters as you would for saving a program.

Next, insert a disk with a copy of the program that is to be automatically executed and press RETURN. If the filename that you entered for the boot program is the name of a program already on the disk, the computer responds with "File exists, press R to replace file." If you want the boot file to save on top of the existing file, press R. If you press any other key, the computer aborts the save and asks for the name of the Autorun boot again. Enter a different filename to continue or press F1 to return to the menu. Autorun is user friendly and prompts you through all the steps listed above to make the boot program quickly and easily.

After you enter the name of the Autorun boot, Autorun saves the boot program on disk. If any errors occur during the save, they will be reported, otherwise the menu screen appears. Once the boot has been written on the disk, you can auto-run your program by typing LOAD "FILENAME",8,1. The filename is the name of the boot program. If the boot program is the first file on the disk, it can be loaded by typing LOAD"*",8,1. When the disk drive stops, your program will be running. Note—you must use the ,8,1 syntax after the filename, because the boot program is in machine language and needs to be loaded into memory away from BASIC's memory area. If you do not use the ,8,1 syntax, your program will not load.

Autorun has four other options. To read and display the disk's directory, press 2. If you have a long directory, the display can be paused by pressing the spacebar. To continue listing the directory, press any key. After the directory has been displayed, press any key to return to the menu.

To send a disk command, press 3. The prompt "Enter disk command:" appears. The general syntax for a command is COMMAND0:FILENAME. For example, to scratch a file, type S0:FILENAME. A complete list of disk commands can be found in the disk drive owner's manual. After the command has been carried out, the menu appears. If any errors occur with the command, they will be reported before returning to the menu. Note—the scratch command causes an error message that reports the number of files scratched even though no error occurs. Autorun supports all disk commands including the U command to reset the drive.

The fourth function changes the current device number. When you first run Autorun, all disk operations are defaulted to device 8, but Autorun can work with device numbers from 8 to 11 inclusive. Changing the device number also changes the Autorun boot. For example, if you change the device number to 9, the Autorun boot will work only on a drive set to device 9. If you work with multiple drives and wish to Autorun programs on a drive other than 8, change the device number to the desired number before selecting menu option 1 (Create Autorun Boot). Once you change the device number, Autorun will read the directory from and send disk commands to the new device only.

The last function, Exit to BASIC, is used by pressing 5. The program stops executing, but remains in memory. The familiar screen colors and the READY message will be displayed. To get back to Autorun, type RUN and press RETURN.

While using any menu option except the last, you can return to the main menu by pressing F1.

How It Works

The key to Autorun is the BASIC warm start vector located at 770-771 ($0302-$0303). After a program loads, the computer's operating system jumps to the location stored in the warm start vector (normally 42115 $A483) to tell it what to do next. Autorun's one-block boot program loads over the warm start vector, changing its contents to point to an unused portion of memory just above the warm start vector from 679 to 767 ($02A7-$02FF). The main part of the Autorun boot loads into this unused section of memory and contains a short machine-language loader program. When your boot program loads, the computer's operating system looks at the warm start vector and jumps to the location set by the Autorun boot (679 $02A7). The computer then executes the short machine-language loader program thinking it is part of the operating system. The loader program restores the warm start vector to its normal value, then loads your program into memory and runs it.

If the program you are auto-running is in BASIC, the boot program will poke the instruction R[SHIFT]U [RETURN] into the keyboard buffer. This fools the computer into thinking that the BASIC statement RUN was typed in. If you told Autorun that your program is in machine language, the boot program will JSR to the start of your program.

One last note about Autorun. If you Autorun a machine-language program that returns you to BASIC, type NEW before you start to program. If there is a BASIC program already present in memory, it is not necessary to type NEW.

Autorun is a powerful utility and a valuable time saver to all disk drive owners. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Autorun

```
200 CL$=CHR$(147):HO$=CHR$(19)
    :POKE 646,1'FWQE
210 E$=CHR$(13)'CGAY
220 POKE 53280,6:POKE 53281,6
    :GOSUB 1070:POKE 53265,11'EEKG
230 DV=PEEK(693):OPEN 15,DV,15
    :R$=CHR$(18):O$=CHR$(146)'HGPK
240 REM   SETUP MENU'BJJD
250 :'ABHB
260 PRINT CL$E$E$TAB(16)"AUTORUN"'CKIH
270 FOR T=1 TO 7:L$=L$+CHR$(163)
    :NEXT'HOSK
280 PRINT TAB(16)L$:PRINT
    TAB(19)"BY"'EJAI
290 PRINT TAB(13)"JONATHAN RODDA":D=4
    :GOSUB 1630'ELRN
300 PRINT TAB(9)"1. CREATE AUTORUN
    BOOT"E$'CENE
310 PRINT TAB(9)"2. VIEW
    DIRECTORY"E$'CEPE
320 PRINT TAB(9)"3. SEND DISK
    COMMAND"E$'CETG
330 PRINT TAB(9)"4. CHANGE DEVICE
    NUMBER"E$'CEBH
340 PRINT TAB(9)"5. EXIT TO
    BASIC"'CCWG
350 FOR T=1 TO 40:UL$=UL$+CHR$(163)
    :NEXT'HRCK
360 D=3:GOSUB 1630:PRINT UL$
    :PRINT TAB(8);'FPYJ
370 PRINT"SELECT ONE OF THE ABOVE"
    :POKE 53265,27'CJCN
380 FOR T=0 TO 9:POKE 631+T,0
    :NEXT'GLVL
390 GOSUB 1380:V=VAL(A$)
    :IF V=0 OR V>5 THEN 390'ISPP
400 ON V GOTO 700,500,540,460'CQHC
410 REM RETURN TO BASIC'BNPD
420 :'ABHA
430 PRINT CL$;:POKE 53280,14
    :POKE 53281,6:POKE 646,14:END'FEUJ
440 REM CHANGE DEVICE NUMBER'BSXH
450 :'ABHD
460 Z=2:GOSUB 570:V=VAL(S$)
    :IF V<8 OR V>11 THEN 460'JVHO
470 POKE 693,V:RUN'CGBH
480 REM READ DIRECTORY'BNUK
490 :'ABHH
500 PRINT CL$:OPEN 1,DV,0,"$"
    :SYS 926'DPPE
510 CLOSE 1:GOSUB 1460:RUN'DHND
520 REM SEND DISK COMMAND'BPBF
530 :'ABHC
540 Z=255:GOSUB 570:PRINT#15,S$
    :GOSUB 1430:RUN'FUGK
550 REM KEYBOARD INPUT ROUTINE'BUYK
560 :'ABHF
570 GOSUB 1480:GOSUB 1520:PRINT HO$
    :D=5'EQTL
580 GOSUB 1630:PRINT C$;:S$=""'DLVL
590 GOSUB 1380:IF A$=E$AND S$<>""THEN
    RETURN'ILRP
600 IF A$=CHR$(34)THEN 590'EJBE
610 IF A$=CHR$(20)AND LEN(S$)>0 THEN
    PRINT A$;:S$=LEFT$(S$,LEN(S$)-1)
    :GOTO 590'NGDP
620 IF Z=5 OR Z=2 THEN IF A$<"0"OR
    A$>"9"THEN 590'KLVL
630 IF Z=1 AND A$<>"B"AND A$<>"M"THEN
    590'JJQL
640 IF Z=1 AND LEN(S$)=1 AND
    A$<>E$THEN 590'JOLN
650 IF A$<" "OR A$>CHR$(128)AND
    A$<CHR$(160)THEN 590'JTVO
660 S$=S$+A$:IF LEN(S$)>Z OR Z=17 AND
    LEN(S$)>16 THEN 570'LYTS
670 PRINT A$;:GOTO 590'CHDJ
680 REM MAIN AUTORUN ROUTINE'BSIO
690 :'ABHJ
700 Z=16:GOSUB 570:M=751:GOSUB 1590
    :POKE 698,L:F$=S$'GDEK
710 Z=1:GOSUB 570:SH=2:IF S$="B"THEN
    SL=119:GOTO 750'IWXM
720 Z=5:GOSUB 570:SA=VAL(S$)
```

```
    :H=SA/256'GUTL
730 HI=INT(H):LO=(H-HI)*256
    :SL=167'GWTN
740 IF SA>65535 THEN 720'DKYJ
750 PRINT E$E$E$"BLANK SCREEN DURING
    LOAD (Y/N)? ";'BHOQ
760 GOSUB 1380:IF A$<>"Y"AND
    A$<>"N"THEN 760'IMAP
770 PRINT A$:A1$=A$'CIDK
780 GOSUB 1380:IF A$<>E$THEN 780'FMYO
790 POKE 710,11:IF A1$="N"THEN POKE
    710,27'FQGQ
800 Z=17:GOSUB 570:GOSUB 1480'DMGG
810 PRINT HO$E$"INSERT A DISK
    WITH"E$'BHSK
820 PRINT"A COPY OF: "R$F$E$'BGXI
830 PRINT"AND PRESS 'RETURN'"E$'BCXK
840 GOSUB 1380:IF A$<>E$THEN 840'FMVL
850 REM SAVE AUTORUN BOOT'BPGM
860 :'ABHI
870 PRINT E$"WRITING: "R$S$'BGQN
880 M=49151:GOSUB 1590'CLCN
890 IF SL=167 THEN POKE 723,LO
    :POKE 724,HI'FSTS
900 POKE 780,1:POKE 781,DV:POKE 782,1
    :SYS 65466'EYXK
910 POKE 780,L:POKE 781,0:POKE 782,192
    :SYS 65469'EAEL
920 POKE 251,SL:POKE 252,SH
    :POKE 780,251'DVTL
930 POKE 781,4:POKE 782,3'CLDJ
940 IF SL=119 THEN POKE 631,147
    :POKE 632,82:POKE 633,213
    :POKE 634,13'HJTS
950 POKE 770,167:POKE 771,2
    :POKE 646,14:SYS 65496'EBFP
960 POKE 770,131:POKE 771,164
    :POKE 646,1'DVAO
970 POKE 723,216:POKE 724,2
    :GOSUB 1430'DSHP
980 IF U$<>"63"THEN RUN'FCEP
990 PRINT E$R$S$O$" EXISTS"E$'BKIQ
1000 PRINT"PRESS 'R' TO REPLACE
     : ";R$S$'BFNA
1010 GOSUB 1380:IF A$="R"THEN
     1030'ELRX
1020 GOTO 800'BDHV
1030 PRINT E$E$"REPLACING: "R$S$'BIFB
1040 PRINT#15,"S0:"+S$:GOTO 880'DJJB
1050 REM READ MACHINE LANGUAGE
     DATA'BXDE
1060 :'ABHY
1070 IF PEEK(679)=169 AND
     PEEK(926)=162 THEN RETURN'IQUI
1080 PRINT CL$E$"PLEASE WAIT,
      READING DATA..."'BFFJ
1090 FOR T=0 TO 87:READ D
     :POKE 926+T,D'GNYI
1100 CK=CK+D:NEXT:IF CK<>12826 THEN
     1620'HSLC
1110 CK=0:FOR T=0 TO 65:READ D
     :POKE 679+T,D'HROD
1120 CK=CK+D:NEXT:IF CK<>7617 THEN
     1620'HRPE
1130 RETURN'BAQW
1140 DATA 162,001,032,198,255,032,
     207'BCGD
1150 DATA 255,032,207,255,032,207,
     255'BCLE
1160 DATA 165,144,208,066,032,207,
     255'BCQF
1170 DATA 240,061,032,204,255,032,
     228'BCAG
1180 DATA 255,201,032,208,005,032,
     228'BCYH
1190 DATA 255,240,251,162,001,032,
     198'BCGI
1200 DATA 255,032,207,255,141,000,
     206'BCYA
1210 DATA 032,207,255,168,174,000,
     206'BCIB
1220 DATA 152,032,205,189,169,032,
     032'BCLC
1230 DATA 210,255,032,207,255,240,
     006'BCAD
1240 DATA 032,210,255,076,223,003,
     169'BCGE
1250 DATA 013,032,210,255,076,169,
     003'BCDF
1260 DATA 032,204,255,096,169,131,
     141'BCMG
1270 DATA 002,003,169,164,141,003,
     003'BCQH
1280 DATA 169,001,168,162,008,032,
     186'BCQI
1290 DATA 255,169,003,162,240,160,
     002'BCCJ
1300 DATA 032,189,255,032,066,166,
     169'BCDB
1310 DATA 011,141,017,208,169,000,
     032'BCTC
1320 DATA 213,255,032,129,255,032,
     216'BCID
1330 DATA 002,076,116,164,166,174,
     164'BCRE
1340 DATA 175,134,045,134,047,132,
     046'BCMF
1350 DATA 132,048,169,004,133,198,
     096'BCAG
1360 REM GET KEYBOARD CHARACTER'BUBI
1370 :'ABHD
1380 GET A$:IF A$=""THEN 1380'EJJI
1390 IF A$=CHR$(133)THEN RUN'FHEJ
1400 RETURN'BAQW
1410 REM READ DISK ERROR'BNUC
1420 :'ABHY
1430 PRINT:INPUT#15,U$,V$,W$,X$'CPLE
1440 IF U$="63" OR U$="00" THEN
     RETURN'GEVG
1450 PRINT E$R$U$","V$","W$","X$'BMHF
1460 PRINT E$"PRESS ANY KEY TO
     CONTINUE"'BCCK
1470 GOSUB 1380:RETURN'CFHG
1480 PRINT CL$:D=20:GOSUB 1630
```

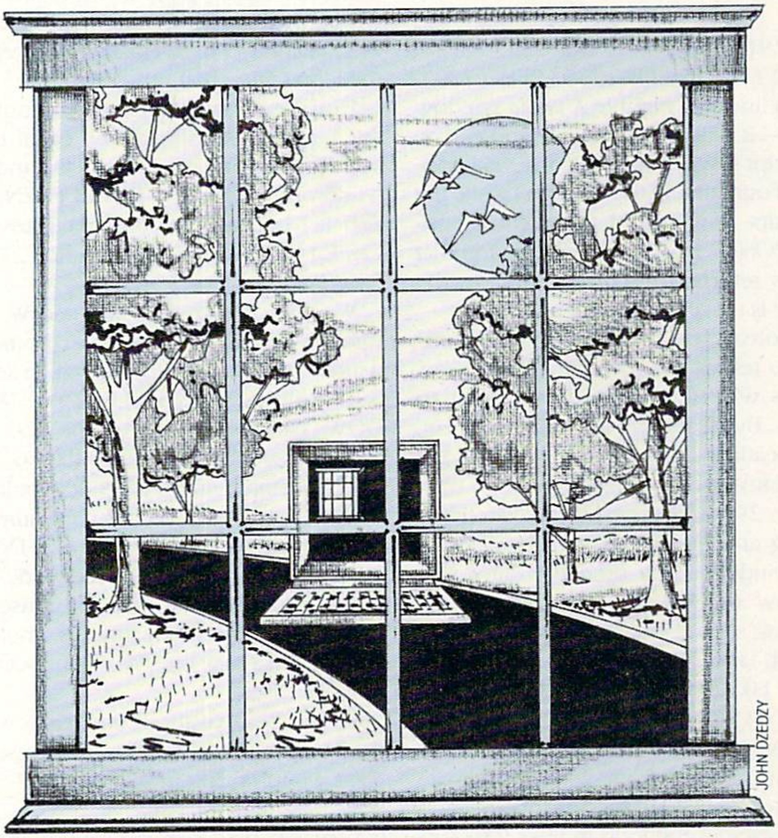
Continued on pg. 128

BY MARK JORDAN

The 128 Mode:

Window Mania

Explore the Commodore 128 in its powerful native mode. Some of the articles in this column may be technical, some not so technical—but we guarantee that they will spark your creativity.



The 128 is more than just a 64 with twice the memory. Likewise, its 80-column display isn't simply a double-wide 64 display. The 80-column mode is a feature-rich piece of hardware controlled by a very powerful chip known as the VDC (Video Display Controller, or the 8563 as it is affectionately known among the technical crowd). This month we're going to examine a few of the esoteric features of the 128's 80-column output.

All the features discussed in this article are demonstrated by the accompanying program. Since we will use a line-by-line analysis, it would be best for you to type the program in. It isn't long and will prove very beneficial to you in understanding the concepts discussed below. Not only that, I believe seeing the colorful effects will inspire you to do more experimenting on your own.

So type it in. And, as always, save it before running it the first time. That way, if you get any lines wrong (it happens, even with the Magazine Entry Program), you won't lose everything in a crash.

The first thing you'll notice when you run the program is all the colorful little windows on the screen. These windows are created in the subroutine in lines 670-720. Let's examine it to see how it works.

```
670 PRINT "(HOME)(HOME)":COLOR5,W(T,5)
```

This line starts by clearing any windows from the operating system with the PRINT "(HOME)(HOME)". Line 670 also uses the COLOR command.

The 80-column screen contains a reverse feature which, if enacted, will not only reverse the entire screen, but will also cause the WINDOW statement to reveal the window area on the screen with the character color. The character color is determined with the COLOR 5 statement. An array—W(T,5)—determines this value for each of the different windows this program produces. Line 160 sneaks this reverse screen into effect with a PRINT E$"R". E$ is defined in line 120 as chr$(27) or ESCAPE.

Now, if you'll glance back up at line 670, you'll see we have followed the COLOR 5 with a subscripted variable—W(T,5). To understand how this array works we must look at lines 20 to 40.

```
20 FORT=1TO6:FORI=1TO5:READ W(T,I):NEXT:NEXT
30 DATA 0,0,24,18,8, 27,2,79,3,4, 27,5,51,10,14
40 DATA 55,5,79,10,6, 27,12,79,18,12, 0,21,79,23,5
```

Line 20 sets up W(T,I) as our array. The value of T can be from 1 to 6, and will be an index identifying the window we are on. The second index in this array (I) can be a number from 1 to 7. Line 20 only sets it from 1 to 5. Later we will see how 6 and 7 are calculated.

As the variable I cycles from 1 to 5, it gathers five window parameters. The first is the upper-left column of our window, the second is the upper-left row, the third is the lower-right column, the fourth is the lower-right row, and the fifth is the color our window will be.

As you can see from lines 30 and 40, the data for each window comes in clusters of 5. Thus, window 1 will have an upper-left corner at 0,0 and a bottom-right corner at 24,18. It will be colored yellow—that's the equivalent of number 8.

Now the rest of our window subroutine should make sense. Look at line 700:

```
700 WINDOW W(T,1),W(T,2),W(T,3),W(T,4),W
```

It simply sets up the four corners of the window we are creating. If we set T=4 then GOSUB 670, Voila! Window #4 is created.

You may be wondering about the W on the end of the WINDOW statement. This variable must either be a 0 or a 1. If it's 0, then we will not clear the window we have chosen. If it equals 1, the window will clear.

Having windows is one thing; being able to print to them the way you want is another. This demo shows how easy it is to jump from window to window. It also shows how you can preserve your cursor location within a window each time you exit it. This way, you will be able to retrieve that position when you re-enter

that window. Line 290 shows how it's done:

```
290W(A,6)=POS(0):
W(A,7)=PEEK(235)-PEEK(229)
```

In this line, the variable A is the window index—it will be between 1 and 6. The subscript 6 will hold the horizontal position of our cursor (the column) while the subscript 7 will hold the vertical position. POS(0) is a BASIC 7.0 function that always returns the current column the cursor is on relative to the window.

Unfortunately, there is no built-in function to tell us the row the cursor is on. That's why we needed to resort to PEEKs. By deducting the value in memory location 229 from 235, we will get the relative row we need.

Line 290 is accessed immediately following any printing that takes place in any window. Each time we enter that window we will, if we don't clear the window, set the cursor back at the proper spot. Line 710 does it.

```
710 IF W=0 THEN CHAR 1,W(T,6),W(T,7),""
```

Now we need to see how we are able to jump around from window to window so easily. All the important stuff takes place in the loop in lines 230-300. So let's take a look at the crucial lines.

```
230 DO:GETKEYA$:
A=INSTR(NU$,A$)
240 IFA=0THEN PRINT
A$;:A=T:GOTO290
250 IF A$=E$ THEN EXIT
260 W=0:IF A>6 THEN A=A-6:PRINT"(CLR)":W=1
270 T=A:GOSUB 670
280 PRINT" PRESS(RVS) 1-6(OFF)
TO CHANGE WINDOWS.";
290W(A,6)=POS(0):
W(A,7)=PEEK(235)-PEEK(229)
300 LOOP
```

Line 230 starts the loop. It asks for a key to be pressed with GETKEY A$. Next it sets variable A using the INSTR command and NU$. If the key that has been pressed is a number 1 through 6, then A will equal that number. If the number is shifted, A will be equal to the number that was pressed plus 6. You will see why this step was necessary in a moment.

Line 240 wonders if A equals zero. If any key other than numbers 1 through 6 was pressed, A will be equal to zero and the rest of this line will function. So, if we pressed the letter A, we will now print that A in the current window at the current cursor position. Then we will set A equal to T, which is our present window number. Next we jump down to line 290 where we'll preserve our cursor position as explained earlier. Finally, we'll repeat the loop (line 300).

However, if we had pressed a number, say a 3, then A will now be equal to 3. The IF-THEN in line 240 will fail and we will drop to line 250. This IF-THEN will also fail because we did not press ESCAPE. (Recall that E$ equals chr$(27) or ESCAPE.)

We will drop to line 260 and W, our variable that decides whether or not a window should be cleared, will be set to 0. This means: DON'T CLEAR THE WINDOW. The second half of line 260 will fail because A is not greater than 6. The IF-THEN statement in this line would be true if we had pressed a shifted number (a shifted 3 would be #). The INSTR statement in line 230 does the work. The purpose for this is to allow the user of this program to clear windows when he switches to a new one; W will be set to 1 in those cases.

In line 270 we set T, our window index, to whatever A is—in this case, 3. Next we jump to our all-important window-creating subroutine starting at line 670 which has been explained already. Window 3 will now be created on the screen and it will NOT be cleared.

Since we have just created a new window, line 280 will print a message for us and remind us that we can change windows again with another 1 to 6 keypress.

Now we arrive at line 290. Just as in the previous case, we must preserve our cursor position within the new window. In line 300 we loop back and start the process.

If you look at line 250 you see how we escape out of this loop—by simply pressing the ESCAPE key. And what happens if we do? Well, we go into a demonstration of how we can poke characters to our 80-column screen, a feat not easily accomplished without the use of machine language.

For those of you interested in how to do that from within your own programs, read the sidebar included with this article. For a description of two window idiosyncrysies, check out the second sidebar.

Once you've seen the demonstration program running, you may be inspired to do some windowing of your own. Next month we are going to write a useful program that I developed for high school students to help them write fiction. It will use seven windows on-screen at a time in a manner similar to the demo program this month. Until then, keep learning.

Poking to the 80-Column Screen

Lines 320-490 show us a demonstration of how we can poke characters to the 80-column screen. It isn't easily accomplished from BASIC—we need a machine-language routine to help.

That routine is poked into memory in lines 80-110. You may use it in your programs as is. Once installed, you need to know the protocol to get it to work right.

To poke to any location on the screen, simply include this line: SYS 2816,character,address/256,address AND 255. The character variable can be any number between 0 and 255. Refer to Appendix D of your system guide for a table of screen code values. The address you are poking to must be a value between 0 and 1999. The 128's 80-screen memory is mapped in this area of the VDC.

That's all there is to it. Poking an attribute, however, is a little more difficult.

Here's the nitty-gritty. For each screen location of the 80-column mode, there is a corresponding memory location that tells how to display the value in that spot. For example, if screen display location 0 (upper-left of screen) contains a 1, an A will be displayed there. Attribute memory begins at memory 2048 in the VDC. Therefore, location 2048 is the memory cell that will tell the computer how to display the A in location 0.

Besides giving our character color, the attribute memory can do several other things. It can set our A flashing, reverse its video output, underline it, or display the alternate character set a. Each bit in the attribute byte is important.

Bit 0 tells us at what intensity to display the character. This is the I part of the RGBI that you may have heard about.

Bit 1 is the blue bit. Set it to mix some blue into your character. Bit 2 is the green bit. Bit 3 is the red bit.

If you're familiar with binary arithmetic, you know that four bits have 16 possible combinations, thus, our 16 possible colors. If all these bits are zero, black will be displayed. If all are 1's, white will be displayed. The 16 colors are as follows:

0 = Black	8 = Red
1 = Dark Gray	9 = Light Red
2 = Blue	10 = Purple

3 = Light Blue
4 = Green
5 = Light Green
6 = Cyan
7 = Light Cyan
11 = Light Purple
12 = Brown
13 = Yellow
14 = Light Gray
15 = White

Bit 4 is the flash bit. If set, the character at the corresponding location will flash.

Bit 5 is the underline bit. If set, the character will be underlined.

Bit 6 is the reverse bit. It will cause the character at the corresponding location to be reversed video if set.

Bit 7 is the alternate character set bit. With the 128 in 80-column mode you can have both character sets on the screen at the same time.

What all this means to you is, simply, you must follow the SYS 2816 with the attribute values you want. If you want a flashing, white character you'll need to choose white (15) plus the flash bit (16). Now you must add 2048 to the location you want to act upon to poke to attribute memory.

To make our upper-left A white and flashing, we will use this set of values:

SYS 2816,15 + 16,0 + 2048

If we decide we'd rather have it green and reversed, we would type

SYS 2816,4 + 64,0 + 2048

Poking to the 80-column screen seems a daunting task to Commodore 64 converts, but once you get the hand of it (and this little machine-language routine), it's not bad at all.

Window Quirks

Please be warned here concerning windows—they may cause a few strange results in your output if you're not careful. As previously stated, the way to clear a window is to print two HOME's back-to-back. This is no problem. But please note this: each time you issue a WINDOW command, a HOME is apparently stored in your computer. If your very next PRINT statement begins with a HOME—goodbye window.

Oddly, this does not occur if you issue a CLEAR when you issue a window statement (the ,1 at the end). Whether this was intended by the engineers who designed the operating system or not, it's hard to guess. But at least now you know about this quirk.

Also, there is a bug in the window statement—at least on my very early 128—which causes the line-linking to mess up. This is mainly just a problem when you are programming and would take more time to explain here than space permits.

If you're interested in seeing it in action, simply list some program lines that are two screen lines long, create some windows in the immediate mode (with an ESCAPE T), then clear the window (with HOME/HOME) and try to insert several characters into the long program lines. An unexpected blank line will suddenly appear. All two-line lines are no longer two-line lines. They've become unlinked and aren't to be trusted. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Window Mania

```
10 FAST'BBJX
20 FOR T=1 TO 6:FOR I=1 TO 5
   :READ W(T,I):NEXT:NEXT'JQBG
30 DATA 0,0,24,18,8, 27,2,79,3,4, 27,
   5,51,10,14'BMQG
40 DATA 55,5,79,10,6, 27,12,79,18,12,
    0,21,79,23,5'BPDI
50 DIM AT(16),KE(255):FOR T=1 TO 16
   :READ AT(T):NEXT'GBWK
60 DATA 0,15,9,6,2,4,2,13,11,12,8,7,1,
   5,3,14'BLXJ
70 FOR T=32 TO 127:KE(T)=1:KE(T+128)=1
   :NEXT:KE(13)=2:KE(20)=3:KE(157)=4
   :KE(29)=5:KE(9)=6:KE(148)=7'NXXC
80 FOR T=0 TO 41:READ A$
   :POKE 2816+T,DEC(A$):NEXT'ITTM
90 DATA 48,A9,12,8D,00,D6,2C,00,D6,10,
   FB,8E,01,D6,A9,13'BWKP
100 DATA 8D,00,D6,2C,00,D6,10,FB,8C,
    01,D6,A9,1F,8D,00,D6'BWPF
110 DATA 2C,00,D6,10,FB,68,8D,01,D6,
    60'BENC
120 E$=CHR$(27):EM$=E$+"M"
    :EL$=E$+"L"'GSJF
130 NU$="123456!"+CHR$(34)
    +"#$%&"+E$'FJFF
140 :'ABHY
150 COLOR 6,1:COLOR 5,1'CHTD
160 PRINT CHR$(14)E$"R[CLEAR,RVS,BLUE]
    ",,,,"[SPACE2,SHFT W]
     I N D O W - [SHFT M]
     A N I A"'CKSL
170 CHAR 1,30,1,"[SHFT P]RESS [RVOFF]
     [SHFT E,SHFT S,SHFT C,SHFT A,
    SHFT P,SHFT E] [RVS]
     TO MOVE TO NEXT DEMONSTRATION.",
    1'BJWU
180 FOR T=1 TO 6:W=1:GOSUB 670
    :NEXT'GLMJ
190 PRINT "[RIGHT5]"CHR$(15)"****",,,,
    ,,,"****"'CLBJ
200 PRINT,"[UP,SHFT P]RESS THE NUMBER
    OF THE WINDOW YOU WISH TO OUTPUT
    TO: 1 - 6"'BBCN
210 PRINT,"[SPACE2,SHFT P]RESS
    [SHFT S]HIFT WITH IT TO CLEAR
    WINDOWS PRIOR TO PRINTING."'BBBO
220 PRINT,,"[SHFT T]YPING WILL OCCUR
    IN THE SELECTED WINDOW.";'BDDK
230 DO:GET KEY A$:A=INSTR(NU$,A$)'FNFF
240 IF A=0 THEN PRINT A$;:A=T
    :GOTO 290'GMIG
250 IF A$=E$ THEN EXIT'EEIE
260 W=0:IF A>6 THEN A=A-6
    :PRINT"[CLEAR]":W=1'IMNK
270 T=A:GOSUB 670'CGUF
280 PRINT" [SHFT P]RESS [RVS] 1 - 6
    [RVOFF] TO CHANGE WINDOWS.";'BBSN
290 W(A,6)=POS(0):W(A,7)=PEEK(235)
    -PEEK(229)'GBSO
300 LOOP'BAKW
310 :'ABHX
320 FOR T=6 TO 1 STEP-1:W=1:GOSUB 670
    :NEXT'IMUG
330 PRINT"[SHFT Y]OU CAN NOW SEE HOW
    TO[SPACE3]"'BAPH
340 PRINT"[SHFT P,SHFT O,SHFT K,
    SHFT E] CHARACTERS AND COLOR"'BALK
```

128 USERS ONLY/THE 128 MODE

```
350 PRINT"TO THE 80-COLUMN SCREEN.
    "'BADJ
360 PRINT"[SHFT W]INDOW 5 WILL
    DISPLAY THE"'BAIK
370 PRINT"PROGRAM LINES.[SPACE11]
    "'BAFJ
380 PRINT"[SHFT I]F CHARACTER IS
    INVISIBLE"'BAKM
390 PRINT"YOU NEED ATTRIBUTES.[SPACE5]
    "'BAQM
400 PRINT"[SHFT P]RESS [BACK ARROW]
     TO [SHFT P,SHFT O,SHFT K,SHFT E]
     ATTRIBUTE"'BAGI
410 T=5:W=1:GOSUB 670:PRINT EM$;
    :LIST 440-490'GVOH
420 DO:T=1:W=0:GOSUB 670:PRINT'FLGG
430 PRINT"[HOME,DOWN10]"E$"@[SHFT C]
    HARACTER TO POKE?"'BCJI
440 INPUT A$:IF A$="[BACK ARROW]
    " THEN GOSUB 510:CD=2048'GPXJ
450 PRINT"[SHFT S]CREEN ADDRESS (0 -
    1999)"'BADJ
460 INPUT AD:AD=AD+CD:CD=0
    :IF T=4 THEN 480'HTWN
470 A=(ASC(A$)-64)AND 255'EMGK
480 SYS 2816,A,AD/256,AD AND 255'DSKL
490 LOOP'BAKH
500 :'ABHY
510 A=0:T=3:W=1:GOSUB 670'EMJF
520 PRINT" 1-16 TO CHANGE COLOR"'BAHG
530 PRINT" [SHFT F] TO CAUSE
    FLASHING"'BADI
540 PRINT" [SHFT U] TO UNDERLINE"'BAJI
550 PRINT" [SHFT R] TO REVERSE"'BAWI
560 PRINT" [SHFT A] FOR ALTERNATE
    CHR-SET"'BAGM
570 PRINT" [SHFT N] FOR NONE";'BBHK
580 T=4:W=1:GOSUB 670'DJSL
590 INPUT"[SHFT C]OLOR";A$:I=VAL(A$)
    :A=AT(I)'EQCQ
600 INPUT"[SHFT A]TTRIBUTE";A$
    :AT=0'CHTG
610 IF A$="F" THEN AT=16'EGLF
620 IF A$="U" THEN AT=32'EGYG
630 IF A$="R" THEN AT=64'EGBH
640 IF A$="A" THEN AC=(AC+128)AND
    128'GOLL
650 A=A+AT+AC:RETURN'EHEJ
660 :'ABHG
670 PRINT"[HOME2]":COLOR 5,W(T,5)'CJHK
680 X=INT((W(T,3)-W(T,1))/2)-4'FTAP
690 CHAR 1,W(T,1)+X,W(T,4)+1,"[SHFT W]
    INDOW "+STR$(T)'FVIT
700 WINDOW W(T,1),W(T,2),W(T,3),W(T,
    4),W'BFLI
710 IF W=0 THEN CHAR 1,W(T,6),W(T,7),
    ""'ESNI
720 RETURN'BAQD
```

END

STRING MAGICIAN

Continued from pg. 63

```
     FD,A0'BHSD
1220 DATA 00,BD,00,FE,D0,09,18,8A,6D,
     6D,FD'BHWE
1230 DATA AA,4C,D2,FC,91,FB,A9,00,9D,
     00,FE'BHCF
1240 DATA C8,C4,FD,D0,E6,AC,6A,FD,60,
     AD,6B'BHQG
1250 DATA FD,09,01,8D,6D,FD,8C,6A,FD,
     20,39'BHNH
1260 DATA FD,A0,00,A9,01,99,00,FE,C8,
     C4,FD'BHXI
1270 DATA D0,F6,AE,6D,FD,A0,00,BD,00,
     FE,C9'BHOJ
1280 DATA 01,F0,09,18,8A,6D,6D,FD,AA,
     4C,0F'BHXK
1290 DATA FD,B1,FB,9D,00,FE,C8,C4,FD,
     D0,E6'BHVL
1300 DATA 20,5A,FD,60,29,7F,60,09,80,
     60,29'BHRC
1310 DATA DF,60,09,20,60,A9,00,A2,00,
     9D,00'BHED
1320 DATA FE,E8,D0,FA,60,20,39,FD,A0,
     00,B1'BHNF
1330 DATA FB,C9,20,D0,02,A9,A0,99,00,
     FE,C8'BHHG
1340 DATA C4,FD,D0,F0,60,A0,00,B9,00,
     FE,91'BHTH
1350 DATA FB,C8,C4,FD,D0,F6,60,00,
     60'BBDH
```

END

RADIO SEARCH

Continued from pg. 87

```
516 IF A%=1 THEN PRINT I$(14)
    :GOTO 524'FNXL
518 PRINT G$"YOU MISIDENTIFIED THE
    CLUES."'BCTQ
520 PRINT"THIS WAS THE SWAT TEAM
    WAITING FOR YOU"'BAXL
522 PRINT"TO LOCATE THE TERRORIST
    RADIO STATION."'BAJO
524 PRINT B$ SPC(10)"CONTINUE
    SEARCHING (Y/N)?"'CFDN
526 FOR J=1 TO 10:GET Y$:NEXT'FIXL
528 GOSUB 108'BDMK
530 GET Y$:IF Y$=""THEN 530'EIFG
532 IF Y$="Y"THEN X=X+1:GOTO 124'GJGK
534 PRINT U$ LL$:GOTO 544'CJUJ
536 PRINT SPC(10)"YOU WERE CORRECT
    !"'CDDO
538 PRINT SPC(7)"END OF A SUCCESSFUL
    GAME."'CCPS
540 PRINT B$"IT TOOK YOU"S$ T$'BGOI
542 PRINT'BACF
544 PRINT B$"ANOTHER GAME (Y/N)
    ?"'BCBN
546 FOR J=1 TO 10:GET Y$:NEXT'FIXN
548 GOSUB 108'BDMM
550 GET Y$:IF Y$=""THEN 550'EIHI
552 IF Y$="Y"THEN RUN'ECSJ
554 PRINT U$ LEFT$(LL$,16)"E N D";
    'CLGM
556 END'BACK
```

END

BY TIM JONES

AmigaBASIC Tutorial

Part 6: Putting It In Motion

A short program demonstrates difficult areas of AmigaBASIC, offering both tips on confusing areas and tricks to make your life easier. Rather than an article followed by a program, we have combined them for the sake of clarity.

```
REM AmigaBASIC (Microsoft) Tutorials
REM Installment #6 Putting it in Motion
REM Tim Jones

' This file assumes that you are familiar with the previous
' information that has been covered with these tutorials.
' Please review the first five installments if you have any
' questions.  For this installment, be sure that you are
' familiar with installment #5 in the June issue.

' We will be examining the various ways to place objects in
' motion and control that motion. The Bobs in this example
' were made using the ObjConvert program from last month.  I
' have tried to keep these DATA segments small to reduce the
' amount of typing required.  If you entered the ObjConvert
' program, you may wish to refrain from typing the DATA
' statements and just create your own BOBs for use in this
' program.

ScreenWindow:

' We'll use a custom screen for more color (keep this in
' mind if you create your own BOBs).

  Title$ = "AmigaBASIC in Motion"+SPACE$(10)+"Tim Jones"
  SCREEN 1,320,200,3,1
  WINDOW 2,Title$,(0,0)-(311,186),0,1

' Close the main window to free up memory

  WINDOW CLOSE 1

SysVariables:

  TRUE = -1 : FALSE = 0 : flag = TRUE : newFlag = FALSE
  RANDOMIZE TIMER
  ON BREAK GOSUB ShutDown : BREAK ON

InitializeBobs:

' Place the BOB definitions into the appropriate SHAPE
' structures.  Set the priorities and disable the
' tracking of collisions by setting the hit masks to
' zero.

GOSUB DefineBobs

OBJECT.SHAPE 1,Ball1$
OBJECT.PRIORITY 1,1
OBJECT.HIT 1,0,0

OBJECT.SHAPE 2,Ball2$
OBJECT.PRIORITY 2,2
OBJECT.HIT 2,0,0

OBJECT.SHAPE 3,Ball3$
OBJECT.PRIORITY 3,3
OBJECT.HIT 3,0,0

OBJECT.SHAPE 4,Ball4$
OBJECT.PRIORITY 4,4
OBJECT.HIT 4,0,0

FOR Delay = 1 TO 500 : NEXT Delay
CLS

' Place them on the screen

FOR Loop = 1 TO 4
  OBJECT.X Loop,INT(RND*200)
  OBJECT.Y Loop,INT(RND*120)
  OBJECT.ON Loop
NEXT Loop

' Now we'll look at each type of movement.

' First, we'll start OBJECT #1 in a straight left to right
' path.

OBJECT.VX 1,20
OBJECT.START 1
GOSUB DelayLoop

' Now we'll give OBJECT 2 a similar path, but we'll use an
' Acceleration factor.

OBJECT.AX 2,2
OBJECT.START 2
GOSUB DelayLoop

' Now, we start OBJECT 3 on a diagonal course by giving
' both X and Y velocities

OBJECT.VX 3,20
OBJECT.VY 3,-16
OBJECT.START 3
GOSUB DelayLoop

' Now let's give OBJECT 4 a strange course by changing
' the values of velocity and acceleration randomly.

OBJECT.VX 4,10
OBJECT.VY 4,-10
OBJECT.START 4

FOR Count = 1 TO 20
  OBJECT.VX 4,INT(RND*50)-25
  OBJECT.VY 4,INT(RND*50)-25

  FOR Delay = 1 TO 400
    IF MOUSE(0) <> 0 THEN Count = 51 : Delay = 401
  NEXT Delay
NEXT Count
FOR Loop = 1 TO 4
  OBJECT.AX Loop,0
  OBJECT.VX Loop,0
  OBJECT.VY Loop,0
NEXT Loop

' Now that we've looked at the ways to put the OBJECTs in
' motion, let's give ourselves a way to control them.  We
' will add the STICK function.  STICK is used in a manner
' similar to MOUSE and MENU.  The number argument for
' STICK(X) varies from 0 to 3 with 0 and 1 used for port 1
' and 2 and 3 used for port 2.  Since we will be using 2
' and 3, we will use a joystick in port 2.

' Let's bring the OBJECTs back into the viewing area.

OBJECT.STOP
FOR Loop = 1 TO 4
  OBJECT.X Loop,20
  OBJECT.Y Loop,Loop*25
NEXT Loop

' Now, with the joystick in Port 2, we give the joystick
' control of the OBJECTs one at a time.

LOCATE 23,1 : COLOR 6
PRINT "Use the JOYSTICK in PORT 2 for control.";
CurBob = 1 : flag = TRUE : Count = TIMER
OBJECT.START CurBob
WHILE flag = TRUE
  IF STICK(2) <> 0 THEN GOSUB HandleStick
  IF STICK(3) <> 0 THEN GOSUB HandleStick
  IF TIMER > Count + 10 THEN
    GOSUB ChangeBob : Count = TIMER
  END IF
WEND

' Now, we'll incorporate COLLISION into the above routine
' and let you bounce the balls off of one another
' transferring control to the bumped ball.

' Bring the BOBs into view

OBJECT.STOP
FOR Loop = 1 TO 4
  OBJECT.X Loop,20
  OBJECT.Y Loop,Loop*25
  OBJECT.ON Loop
NEXT Loop

' Now, let's redefine the OBJECT.HIT variables to allow the
' BALLS to collide with one another.

OBJECT.HIT 1,2,2
OBJECT.HIT 2,2,2
OBJECT.HIT 3,2,2
OBJECT.HIT 4,2,2

' Now we'll discuss the OBJECT.HIT FUNCTION.
```

```
' The syntax is OBJECT.HIT object#, memask, hitmask
' The object# is the number of the OBJECT that you are
'   assigning the bitmask to.
' The memask variable is the bit that you are assigning to
'   the OBJECT.  This identifies it to the COLLISION
'   checking function.
' The hitmask variable is the mask that tells the COLLISION
'   checking function which OBJECTS (as defined by their
'   memask) this OBJECT will register COLLISIONs with.
' One thing that we must remember when assigning memasks is
' that the borders are always memask 1.  This is what the
' memasks look like for the above OBJECTs:

' OBJECT #  |  128  064  032  016  008  004  002  001
' ---------------------------------------------------
'     1     |   0    0    0    0    0    0    1    0
'     2     |   0    0    0    0    0    0    1    0
'     3     |   0    0    0    0    0    0    1    0
'     4     |   0    0    0    0    0    0    1    0

' The hitmasks then look like this:

' OBJECT #  |  128  064  032  016  008  004  002  001
' ---------------------------------------------------
'     1     |   0    0    0    0    0    0    1    0
'     2     |   0    0    0    0    0    0    1    0
'     3     |   0    0    0    0    0    0    1    0
'     4     |   0    0    0    0    0    0    1    0

' As shown in these diagrams, we are setting the memask for
' ALL OBJECTs to the same CLASS.  This CLASS can be
' considered in the following manner:  If an OBJECT is of
' a given CLASS, any other OBJECT with that CLASS set in its
' hitmask will return a COLLISION report.  In our example,
' we have assigned the same CLASS to all OBJECTS and
' assigned their hitmasks to indicate that each is to report
' a COLLISION with any other.  Thus, all four OBJECTs have
' the same memask and hitmask.

' Set up the Control loop structure

CLS : LOCATE 22,1 : COLOR 6
PRINT "Use the JOYSTICK in PORT 2 for control."
PRINT SPACE$(8) + "CLICK the MOUSE to Exit";
CurBob = 1 : flag = TRUE

OBJECT.VX CurBob,20 : OBJECT.VY CurBob,0
OBJECT.START CurBob
WHILE MOUSE(0) <> 0 : WEND
WHILE flag = TRUE
  IF STICK(2) <> 0 THEN GOSUB HandleStick
  IF STICK(3) <> 0 THEN GOSUB HandleStick
  ON COLLISION GOSUB HandleCollision : COLLISION ON
  IF MOUSE(0) <> 0 THEN flag = FALSE
WEND

' Now. let's take a look at the OBJECT.CLIP function.
' According to the AmigaBASIC manual. this function defines
' a rectangle outside of which no objects will be drawn;
' this is incorrect.  OBJECT.CLIP is used to redefine the
' location of the borders.  This can be used in conjunction
' with a porthole or windshield type of display where you
' don't want any objects to move outside of the field of
' view.

' We will first make copies of our BOBs.  Then. we create a
' screen and define a rectangular clip region to control
' COLLISION detection.

CLS : OBJECT.OFF
OBJECT.SHAPE 5.1 : OBJECT.SHAPE 6.1 : OBJECT SHAPE 7,1
OBJECT.SHAPE 8,2 : OBJECT.SHAPE 9.2 : OBJECT.SHAPE 10.2

FOR x = 1 TO 500
  xLoc = INT(RND*WINDOW(2))
  yLoc = INT(RND*WINDOW(3))
  colour = INT(RND*WINDOW(6))
  PSET(xLoc,yLoc),colour
NEXT x
OBJECT.CLIP (50.20)-(270.120)
LINE(49,19)-(271.121),0.bf

' Now. we'll redefine the collision masks. set the
' velocities to zero and place the BOBs on the screen and
' move them around with the Joystick.  Hit the spacebar to
' change the active BOB.

FOR Loop = 1 TO 10
  OBJECT.HIT Loop.2.2
  OBJECT.VX Loop.0 : OBJECT.VY Loop.0
NEXT Loop

FOR Loop = 1 TO 10
  OBJECT.X Loop.(20*Loop)+30
  OBJECT.Y Loop.100
  OBJECT.ON Loop
  OBJECT.START Loop
NEXT Loop

ClipLoop:
  ON COLLISION GOSUB ClipCollision : COLLISION ON
  WHILE MOUSE(0) <> 0 : WEND
  WHILE MOUSE(0) = 0
    IF INKEY$ = CHR$(32) THEN GOSUB ChangeBob2
    IF STICK(2) <> 0 THEN GOSUB HandleStick
    IF STICK(3) <> 0 THEN GOSUB HandleStick
  WEND

' One final note about OBJECT.CLIP: if you resize the
' window that your clip region is in to a size that allows
' any window border to be within the same side clip border.
' the new window border location will supercede the clip
' region border.  Then. if you resize the window back out.
' you will have to redefine the clip region. or the border
' in question will move out to the new window border
' location.

' The final (for this installment) OBJECT function is the
' OBJECT.PLANES function (Sorry I left it out of installment
' 5. OOPS!).  OBJECT.PLANES allows you to utilize one
' OBJECT.SHAPE yet make them appear as different OBJECTS via
' color manipulation.

LINE(0.0)-(311,186),0.bf
CLS : LOCATE 23.1
OBJECT.CLOSE ' let's start from scratch
OBJECT.SHAPE 1.Ball1$
OBJECT.SHAPE 2.Ball2$
FOR Loop = 3 TO 6
  OBJECT.SHAPE Loop.1
NEXT Loop
OBJECT.PLANES 3.4.2
OBJECT.PLANES 4.6,1
OBJECT.PLANES 5.7.3
OBJECT.PLANES 6,3.7
FOR Loop = 1 TO 6
  OBJECT.X Loop.Loop * 20
  OBJECT.Y Loop.35+(Loop * 20)
  OBJECT.ON Loop
NEXT Loop

' Now let's play with the colors

FOR Loop = 1 TO 25
  Pick = INT(RND*7)
  OnOff = INT(RND*7)
  OBJECT.PLANES INT(RND*6)+1.Pick,OnOff
  FOR Delay = 1 TO 150 : NEXT Delay
NEXT Loop
PRINT "CLICK MOUSE to END";
WHILE MOUSE(0) <> 0 : WEND
WHILE MOUSE(0) = 0 : WEND

' Notice how OBJECTS 3,4.5 & 6 are different from #1 even
' though they are all using the same DATA.  Even though I
' could spend pages describing the way the bit masks work
' (PlanePick & PlaneOnOff), I will just suggest that you
' play with the numbers that are in the function.  One
' thing that I will discuss is how the values are chosen.
' The MAXIMUM number that can be placed in either value
' is equal to the number of allowable colors for a given
' screen minus 1 (colors start from 0. not 1).  In this
' example we have 3 bit planes. which gives us 8 color
' choices.  Therefore. the maximum number we can use in
' either value is 7 ( 8 - 1 ).  PlanePick (the first value)
' decides which of the bitplanes available your OBJECT will
' be drawn in.  A value of 3 would use planes 1 and 2 for
' the display.  A value of 0 would use plane 1 only (a 2
' color OBJECT!).  And so it goes.  If you consider the bit
' values as bits 0-4 (5 bitplanes), then you can use the
' following chart for plane selection:

'  4 | 3 | 2 | 1 | 0
' -------------------
'  0   0   0   0   1  = 0  (bitplane 1)
'  0   0   0   1   0  = 1  (bitplane 2)
'  0   0   0   1   1  = 2  (bitplanes 1 & 2)
'  0   0   1   0   0  = 3  (bitplane 3)
'  0   0   1   0   1  = 4  (bitplanes 1 & 3)

' And so forth.  The key is to remember that the actual
' number is one less than the actual additive value.
' As for PlaneOnOff. we use a similar selection structure
' for choosing its value.  The key difference is the manner
' in which the unused plane data is presented.  PlaneOnOff
' allows you to account for ALL the bits of an OBJECT by
' logically ORing them into ONE bitplane called the SHADOW.
' The main thing to remember is that the SHADOW is placed in
' the UNUSED planes (those not chosen by PlanePick)
' according to the value of PlaneOnOff.  Once again. the
' best way to see what is happening is to physically
' manipulate the values in PlanePick and PLaneOnOff. keeping
' in mind the depth of the screen you're working with.
```

```
' Until next time...

ShutDown:

  WINDOW CLOSE 2
  SCREEN CLOSE 1
  WINDOW 1,"BASIC",(0,0)-(617,186),31,-1
  END

HandleCollision:

  ObjNum = COLLISION(CurBob)
  IF newFlag = TRUE THEN RETURN
  IF ObjNum < 1 THEN OBJECT.START CurBob : RETURN
  OBJECT.START ObjNum
  OBJECT.VX ObjNum,(OBJECT.VX(CurBob))
  OBJECT.VY ObjNum,(OBJECT.VY(CurBob))
  CurBob = ObjNum
  RETURN

ClipCollision:

  ObjNum = COLLISION(CurBob)
  LOCATE 23,1 : BEEP
  PRINT "COLLISION Detected"+STR$(ObjNum)+" ";
  IF ObjNum < 0 THEN GOSUB ChangeBob2 : RETURN
  OBJECT.START CurBob  ' restart the object
  RETURN

ChangeBob1:

  OBJECT.STOP CurBob
  CurBob = CurBob + 1
  IF CurBob > 4 THEN flag = FALSE : RETURN
  OBJECT.START CurBob ' start the new object
  RETURN

ChangeBob2:

  OBJECT.STOP CurBob
  CurBob = CurBob + 1
  IF CurBob > 10 THEN CurBob = 1 : RETURN
  OBJECT.START CurBob ' start the new object
  RETURN
HandleStick:

  IF STICK(2) = 1 THEN
    OBJECT.VX CurBob,20
    IF STICK(3) = 0 THEN OBJECT.VY CurBob,0
  END IF
  IF STICK(2) = -1 THEN
    OBJECT.VX CurBob,-20
    IF STICK(3) = 0 THEN OBJECT.VY CurBob,0
  END IF
  IF STICK(3) = 1 THEN
    OBJECT.VY CurBob,20
    IF STICK(2) = 0 THEN OBJECT.VX CurBob,0
  END IF
  IF STICK(3) = -1 THEN
    OBJECT.VY CurBob,-20
    IF STICK(2) = 0 THEN OBJECT.VX CurBob,0
  END IF
  RETURN

DefineBobs:

PRINT "Stand by...Reading in DATA"

DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H03,&H00,&H00,&H00,&H0B
DATA &H00,&H00,&H00,&H0B,&H00,&H18,&H00,&H07
DATA &H00,&H00,&H1F,&H00,&H20,&H80,&H40,&H40
DATA &H80,&H20,&H80,&H20,&H80,&H20,&H80,&H20
DATA &H80,&H20,&H40,&H40,&H20,&H80,&H1F,&H00
DATA &H1F,&H00,&H20,&H80,&H40,&H40,&H80,&H20
DATA &H80,&H20,&H80,&H20,&H80,&H20,&H80,&H20
DATA &H40,&H40,&H20,&H80,&H1F,&H00,&H00,&H00
DATA &H1F,&H00,&H3F,&H80,&H64,&HC0,&H7B,&HC0
DATA &H7B,&HC0,&H73,&HC0,&H7B,&HC0,&H31,&H80
DATA &H1B,&H00,&H00,&H00

FOR BobCnt = 1 TO 92
  READ BobStr%
  Ball1$ = Ball1$ + CHR$(BobStr%)
NEXT BobCnt

DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H03,&H00,&H00,&H00,&H0B
DATA &H00,&H00,&H00,&H0B,&H00,&H18,&H00,&H07
DATA &H00,&H00,&H1F,&H00,&H20,&H80,&H40,&H40
DATA &H80,&H20,&H80,&H20,&H80,&H20,&H80,&H20
DATA &H80,&H20,&H40,&H40,&H20,&H80,&H1F,&H00
DATA &H00,&H00,&H1F,&H00,&H3F,&H80,&H6E,&HC0
DATA &H5B,&H40,&H7B,&HC0,&H7F,&HC0,&H71,&HC0
DATA &H2E,&H80,&H1F,&H00,&H00,&H00,&H1F,&H00
DATA &H20,&H80,&H40,&H40,&H80,&H20,&H80,&H20
DATA &H80,&H20,&H80,&H20,&H80,&H20,&H40,&H40
DATA &H20,&H80,&H1F,&H00

FOR BobCnt = 1 TO 92
  READ BobStr%
  Ball2$ = Ball2$ + CHR$(BobStr%)
NEXT BobCnt

DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H03,&H00,&H00,&H00,&H0B
DATA &H00,&H00,&H00,&H0B,&H00,&H18,&H00,&H07
DATA &H00,&H00,&H00,&H00,&H1F,&H00,&H1F,&H00
DATA &H6E,&HC0,&H7B,&HC0,&H79,&HC0,&H6E,&HC0
DATA &H71,&HC0,&H3B,&H80,&H1F,&H00,&H00,&H00
DATA &H1F,&H00,&H3F,&H80,&H5F,&H40,&HEE,&HE0
DATA &HFB,&HE0,&HF9,&HE0,&HEE,&HE0,&HF1,&HE0
DATA &H7B,&HC0,&H3F,&H80,&H1F,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H00

FOR BobCnt = 1 TO 92
  READ BobStr%
  Ball3$ = Ball3$ + CHR$(BobStr%)
NEXT BobCnt

DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H03,&H00,&H00,&H00,&H0B
DATA &H00,&H00,&H00,&H0B,&H00,&H18,&H00,&H07
DATA &H00,&H00,&H1F,&H00,&H3F,&H80,&H7F,&HC0
DATA &HEE,&HE0,&HFF,&HE0,&HFB,&HE0,&HF3,&HE0
DATA &HFF,&HE0,&H60,&HC0,&H3F,&H80,&H1F,&H00
DATA &H1F,&H00,&H20,&H80,&H40,&H40,&H80,&H20
DATA &H80,&H20,&H80,&H20,&H80,&H20,&H80,&H20
DATA &H40,&H40,&H20,&H80,&H1F,&H00,&H1F,&H00
DATA &H3F,&H80,&H7F,&HC0,&HEE,&HE0,&HFF,&HE0
DATA &HFB,&HE0,&HF3,&HE0,&HFF,&HE0,&H60,&HC0
DATA &H3F,&H80,&H1F,&H00

FOR BobCnt = 1 TO 92
  READ BobStr%
  Ball4$ = Ball4$ + CHR$(BobStr%)
NEXT BobCnt
PRINT "DONE"
RETURN

DelayLoop:
  FOR Delay = 1 TO 2000 : NEXT Delay
RETURN
```

END

BY MATT BLAIS

Amiga ZPlot

If you're in the lamentable position of having a color printer without any pictures to print, this program is just what the doctor ordered. But even if you're not lucky enough to have a color printer, stunning images are still fun to generate on your screen.

ZPlot makes full color plots of three-dimensional functions of the form Z = f(X,Y) where X and Y are the horizontal and vertical coordinates, respectively, of a point on the screen. Z, the value of the function at the point (X,Y), is represented on the screen as the color of the pixel at (X,Y).

Running ZPlot

When you run ZPlot, your first decision is between loading an old plot or generating a new one. Type L to load a previously saved plot from disk or G to generate a new plot.

However, there are a few things you must do before ZPlot can generate a new plot.

Step 1 Define the function: The function to be plotted is defined in an AmigaBASIC DEF FN statement and takes the form

DEF FNz(x,y) = ...

There are many sample functions at the beginning of the program under the heading Plot Functions which have been remarked out. To plot one of these functions, remove the REM that precedes the DEF FNz... line (so it becomes an actual AmigaBASIC DEF FN statement instead of a remark) and make sure all other DEF FNz statements have a REM preceding them so there is only one real one. Statements which define other FN functions ("DEF FNdec," "DEF FNmin," or DEF-anything except "DEF FNz") should be left alone!

Step 2 Determine the size of the viewing area: ZPlot will ask for width and height of the plot and give you the maximum possible value for each. The values you enter determine the size (in low-resolution pixels) of the plotting area. Time is a consideration in choosing plot size; plotting proceeds at a rate of anywhere from 20 to 60 pixels per second, depending on the complexity of the function being plotted. At a rate of 50 pixels per second, a viewing area of 100 X 88 pixels (about one-sixth of the total screen area) would take 100 X 88/50 seconds—about three minutes—to draw.

Step 3 Define the viewing range: The first element of the viewing range is the X range, which consists of the starting and ending values for X, the horizontal screen axis. These are the values of X at the left and right edges, respectively, of the plotting area.

Each of the example plot functions listed at the beginning of the program has a comment line after it with the function's name, a suggested X range ("x:(-7,7)"), and the correct Z range. The X ranges are only suggestions, however. Feel free to experiment with them to look at different portions of the function.

The program next asks whether or not you want an aspect ratio of one. This is equivalent to saying, "Do you want your circles round?" Answering "yes" here will cause the program to calculate the correct Y range that goes with the X range and window dimensions you specified in order to keep the picture proportional. If this is what you want, all you have to do next is specify the value of Y at the center of the window. Zero is the suggested Y center value for all of the example functions which do not have an explicit suggested Y center in the comment line after the function definition ("Y:(2.2)"). An aspect ratio of one is recommended for all of the example functions. The program will calculate the proper values for Y at the top and bottom edges of the window for an aspect ratio of one.

If you want ovular circles and rectangular squares, then you must choose Y values for the bottom and top edges of the plot, instead of the Y center value. It's best to stick with an aspect ratio of one in the beginning, however, as the further the ratio gets from one, the more distorted the picture becomes.

Step 4 Define the function (Z) range: This is the most important range. Entering improper values here will cause an error at worst, or a comparatively dull picture at best. Each example function definition has in the comment line the correct Z range which will give a good picture ("z:(-1,1)"). This range represents the lowest and highest values that will be computed for Z in the entire picture. These are needed to correctly scale the function values to use all the available colors, but try not to use any more.

The ZPlot program has an auto-range feature that looks at random points in the plotting area and makes an educated guess at what the Z range for the function will be. If you already know what the Z range should be, don't use this feature as it is never perfectly accurate. If you have no idea of what the function's range will be, answer yes to the "Function auto-ranging (Y/N)?" prompt. You must then enter the number of points you wish tested to determine the range. The more points tested, the more accurate auto-range's estimate will be, but the longer it will take. Four hundred points usually does a good job. If you use the auto-ranging feature and the program later encounters an error while plotting, then the Z range probably was not large enough; try auto-ranging again with more test points.

If you know the function's range, reply no to the "auto-ranging (Y/N)?" prompt and then enter the lower and upper bounds of the function.

ZPlot should now clear the screen and start drawing the plot. If an error occurs, there are a couple of things which may be to blame.

1. You may have a syntax error in your function definition statement. Check it for unmatched parentheses or other syntax errors.

2. You may get a division by zero error if you define a function which uses X or Y in the denominator of a division operation and zero lies within the X or Y range.

3. You may have specified a Z range that is too small. If you suspect this to be the case, try using the auto-range feature with more test points.

4. You may have a bad color palette definition (see the section on color palettes below).

When plotting has finished, the plot stays on the screen and you have the following options.

Color Control

Pressing the 0 key reverses the current color palette, so light areas become dark and vice versa.

Pressing a key from 1 to 9 will use the color palette by that number to display the plot. As published, the program only has six palettes, so pressing the 7, 8 or 9

keys will flash the screen to indicate that there is no palette available by that number.

Saving the Picture

If you have a program which saves Amiga screens (there is a public domain program called saveILBM which will do this), then using it is the fastest way to save the plot. If you do not have such a program, then there are two ways to save the plot from within the ZPlot program.

Pressing the N key will cause ZPlot to ask you for the name of the file you wish to save the plot in. If you use this option, you can specify the drive and directory to save to as part of the file-name.

Pressing the S key will save the plot in a file named Zpic1.ILBM in the current directory. If that file already exists, then ZPlot will increment the number in the filename until it finds a name which does not already exist in the current directory, so there is never any danger of writing over a previously saved plot. Note that using the S key does not let you specify the directory in which the file will be saved. Before you run ZPlot, you should use the AmigaBASIC command CHDIR to set your current directory to wherever you will want to save plot files.

Exiting ZPlot

Pressing any key other than N, S or a digit will end the program and the plot screen will be closed. If you want to end the program but keep the plot screen open, break the program with a Control C; the screen will be behind the Workbench screen. When the program ends or is broken by Control C, you will see the window where you entered the parameters to generate the picture. If you find a new function you particularly like, you may want to copy down the parameters or add them into the program in the form of another function definition and comment line.

Polar Functions

Any point in a plane can be referenced by either its (X,Y) cartesian coordinates or by its (radius,angle) coordinates. The radius component of a polar coordinate is the point's distance from the origin, and the angle component (commonly called theta) is the angle with respect to the X axis of the line which connects the point to the origin. For a point with the cartesian coordinates (X,Y), the corresponding polar coordinates (radius,angle) of the point are computed by the equations:

radius = SQR(X ↑ 2+Y ↑ 2)
theta = ATN(Y/X)

The actual determination of theta in ZPlot is more complicated because AmigaBASIC's arctangent function has a truncated range.

Three dimensional polar functions have the form Z= f(radius,theta) where Z, the function's value at a given polar coordinate, will again be represented by the color of the point's corresponding pixel on the screen. The corresponding radius and angle (theta) for a point (X,Y) are defined in ZPlot as FNr(X,Y) (the radius) and FNt(X,Y) (theta, the angle), thus you can use polar coordinates in your function definitions as well as rectangular coordinates. Some of the example plot functions included with the program are polar, such as Crystal Ball and Spirals.

Two-Dimensional Functions

The last two definitions of FNz in the Plot Functions section let you plot two-dimensional functions (rectangular or polar). If you want to plot a rectangular two-dimensional function, use the next to last FNz definition and set the DEF FNy(X) statement below it to define the function (in terms of theta) that you wish to plot (t is the angle theta and the function's return value is the radius of the function at that angle). The example FNp(t) in the program prints a simple polar flower.

Being Creative

If you are interested in discovering your own functions, there are several guidelines which will make your search more fruitful.

1. Use small windows. A small window (50 x 44 makes a square) will give you a good idea of whether a function merits closer examination, or whether, as with most experiments, you should try something different. Many functions will be either too repetitive or too complex, traits which can be as easily spotted with a small window as with a larger one which takes much longer to plot.

2. Use trigonometric functions. There are two big advantages to using sine and cosine in ZPlot functions—they always have a range of -1 to +1 and they are cyclic, giving bands of color. Any plot function which is a sine or cosine (or product of sines and cosines) will nearly always have a function range of -1 to +1. Plot functions which are the sum or difference of "n" sines or cosines usually have a range from -n to n.

3. Symmetry. If you want more symmetry in a function, use absolute values of X and Y. The function Lace takes this to an extreme, using an auxiliary function FNu(X) to create a center of symmetricality at (21,0) instead of at the origin. In Lace, FNu(X) is used everywhere in place of X, and ABS(Y) is used instead of Y.

4. Alterations. One of the simplest (and most fruitful) ways to search for new functions is to slightly alter existing functions which have proven interesting. Looking at the definitions of the example functions, you can tell that many are related, such as Interference I and Interference II, or Crystal Ball and Ripples.

5. Choosing a good X range. For functions which are basically trigonometric like the example functions, X and Y ranges from (-6,6) to (-30,30) will usually cover the interesting parts of the plot. When looking at a new function, start with a narrow X range (-9 to 9 or -7 to 7) and try wider ranges if the narrow ones look promising.

6. Avoid division. Any time you divide, you risk dividing by zero, unless you can guarantee that the divisor will never be zero. To be safe, you can add a constant amount to the divisor to keep its value above zero, like what is done in Lips. There, since the cosine of anything is always between -1 and +1, adding 1.1 to the cosine results in a denominator that is always between +0.1 and +2.1.

7. Polar hints. In a polar function, multiplying theta (FNt(X,Y)) by a whole number will increase the number of cycles the function undergoes travelling around the origin. For example, if cos(FNt(X,Y)*2) gives you two loops, then you can expect cos(FNt(X,Y)*8) to give you eight loops. Polar functions are usually circularly symmetrical about the origin, but they take longer to plot because the radius and angle of each pixel must be computed from its X and Y coordinates.

Adding Color Palettes

If you want to add a new color palette, you need to know the format of the color data. Using palette number six as an example, palette data starts immediately after the label Palette6:. The first data item is the number of colors in the palette. All the palettes in the pro-

gram use 28 colors, even though most have fewer than 28 distinct colors (some colors are duplicated). Keeping all the palettes the same length allows you to switch from one palette to another after the picture has been drawn without losing detail in a palette with fewer colors than the palette which the function was plotted with, or losing contrast in one with more colors. After the number of colors data item, there follows exactly that many color definitions. Each color definition is composed of three hexadecimal digits separated by commas. Each hexadecimal digit (0 through 9 or A through F for 16 possible values) represents the amount of red (the first digit), green (the second digit), or blue (the third digit) in that color. This data is in the same format as the palette data produced by the Hues program published in the April, 1987, issue of *Commodore Magazine* ("Curing the Red-Green Blues"), so you can use Hues to generate new color palettes for ZPlot.

The data for palette number seven must immediately follow the label Palette7:. Also, for the program to recognize that there is indeed a palette number seven, you must change the line maxpal = 7, or maxpal = (highest palette number currently defined). This line is in the Constants section near the top of the program. Also in the Constants section is the line pal = 6, which determines which palette (and, therefore, how many colors) will be used initially to plot the function.

Being Even More Creative

ZPlot saves plots as standard uncompressed Amiga IFF Interleaved Bitmap (ILBM) files, including the colors which were on the screen when the file was saved. If you own Electronic Arts' *DeluxePaint* or any other paint program that will read IFF format files, you can use it to edit a saved plot. In the case of *DeluxePaint*, a ZPlot file must be loaded as a brush. The first thing to do is plop the picture down in the middle of the screen and choose the Use Brush Palette option in the color control submenu under Picture, which sets *DeluxePaint's* screen colors to the ones which were on ZPlot's screen when you saved the plot.

Now the fun starts. You can use all of *DeluxePaint's* brush manipulations like flip, bend and rotate to create something new. Choose a small piece of the picture and erase the rest, then flip your piece over to create a symmetrical design, which can also be flipped, duplicated, rotated and bent ad nauseum. It is much easier to produce symmetrical designs this way than directly from a function definition (as Lace does), and using a paint program such as *DeluxePaint* allows you to crop a part of the picture and get rid of the parts which degrade into infinite detail.

With ZPlot and your Amiga, you can discover some of the beauty of the world of mathematics. Send us your most exciting discoveries (just the function definition, ranges and color palette used to create the plot), and we may publish the best in a future issue.

Mandelbrot beware: ZPlot is here! ■

ZPlot

```
   OPTION BASE 0
   DIM P%(100), red(31), grn(31), blu(31)

' ****************** PLOT FUNCTIONS ********************

    DEF FNz(x,y)=SIN((x*y)/(1.1+COS(x+y)))
  ' Lips                  x:(-7,7)       z:(-1,1)
REM DEF FNz(x,y)=COS(x*SIN(x*y)+y*COS(x+y))
  ' Psychadelia           x:(-7,7)       z:(-1,1)
REM DEF FNz(x,y)=SIN(y)*COS(x/3)+COS(x)*SIN(y/3)
  ' Bowties               x:(-15,15)     z:(-1.58,1.58)
REM DEF FNz(x,y)=-COS((ABS(y)-ABS(FNu(x)))*
        SIN(SQR(ABS(FNu(x)*y))))
    DEF FNu(x)=21-ABS(x-21) ' -- Used in "Lace."
  ' Lace                  x:(-.5,42.5)   z:(-1,1)
REM DEF FNz(x,y)=COS(FNr(x,y))
  ' Bullseye              x:(-16,16)     z:(-1,1)
REM DEF FNz(x,y)=COS(FNr(x+12.56,y))+COS(FNr(x-12.56,y))
  ' Moire I               x:(-38,38)     z:(-2,2)
REM DEF FNz(x,y)=COS(FNr(x+12.56,y))+COS(FNr(x-12.56,y))
        +COS(FNr(x,y-21.75))
  ' Moire II              x:(-44,44)     y:(11)  z:(-3,3)
REM DEF FNz(x,y)=SIN(ABS(x)*ABS(y)*COS(ABS(x)+ABS(y)))
  ' Cube                          x:(-7,7)       z:(-1,1)
REM DEF FNz(x,y)=SIN(FNr(x,y))*COS(12*FNt(x,y))
  ' Dartboard                     x:(-12,12)     z:(-1,1)
REM DEF FNz(x,y)=SIN(12*FNt(x,y)+SIN(FNr(x,y))*5)
  ' Crystal Ball                  x:(-15,15)     z:(-1,1)
REM DEF FNz(x,y)=COS(FNt(x,y)*2+.7*SIN(FNr(x,y)))
  ' Ripples                       x:(-18,18)     z:(-1,1)
REM DEF FNz(x,y)=(COS(x)+COS(y))*SIN(x*y)
  ' God's Eye                     x:(-9,9)       z:(-2,2)
REM DEF FNz(x,y)=SIN(COS(y-x*x))+SIN(COS(x-y*y))
  ' Interference I                x:(-12,12)     z:(-2,2)
REM DEF FNz(x,y)=SIN(COS(y-x*x))*SIN(COS(x-y*y))
  ' Interference II               x:(-15,15)     z:(-1,1)
REM DEF FNz(x,y)=SIN(.5*FNr(x,y)+4*FNt(x,y))
        +COS(.5*FNr(x,y)-8*FNt(x,y))
  ' Spirals                       x:(-27,27)     z:(-2,2)
REM DEF FNz(x,y)=x
  ' Palette Color Bars      x:(0,1)              z:(0,1)

REM DEF FNz(x,y)=1-FNmin(1,ABS(y-FNy(x)))
  ' 2-D Rectangular Plot of y=FNy(x)             z:(-1,1)
    DEF FNy(x)=SIN(x)
  ' Sine wave plot (2-D)    x:(-9,9)             y:(-1,1)

REM DEF FNz(x,y)=1-FNmin(1,ABS(FNr(x,y)-FNp(FNt(x,y))))
   ' 2-D Polar Function Plot of r=FNp(theta) z:(-1,1)
     DEF FNP(t)=COS(t*8)
   ' Flower (polar 2-D)        x:(-1.2,1.2)  y:(0)

' ****************** PROGRAM FUNCTIONS ******************

 DEF FNr(x,y)=SQR(x*x+y*y)
 ' -- Polar radius
 DEF FNt(x,y)=ATN(y/(x+e0*SGN(x)))
       -pi*(x<0)-2*pi*(x>=0 AND y<0)
 ' -- Polar angle (theta).
 DEF FNmin(a,b)=-(a<b)*a-(a>=b)*b
 ' -- Minimum of two arguments.
 DEF FNmax(a,b)=-(a<b)*b-(a>=b)*a
 ' -- Maximum of two arguments.
 DEF FNdec(a$) = (ASC(UCASE$(a$))-48+(a$>"9")*7)/15
 ' -- Converts a hex character to a fraction.

' ********************** CONSTANTS **********************

 maxc   = 31           ' -- Maximum color register #.
 maxpal = 6            ' -- Maximum palette # available.
 pal    = 6            ' -- Choose your initial palette # here.
 paln   = pal
 mode  = 0             ' -- Palette reversal mode.
 xmax   = 297          ' -- Maximum window width.
 ymax   = 186          ' -- Maximum window height.
 asp    = .88          ' -- Aspect ratio of pixels (Y:X).
 e0     = 1.3579E-05       ' -- A small constant.
 pi     = 3.141593         ' -- Single precision Pi.
 tc     = 52               ' -- Tab column for inputs.

Zplot:
  ON ERROR GOTO ErrorRtn

  GorL:
  CLS : PRINT : PRINT " Generate or Load picture (G/L) ?  ";
  GOSUB GetAKey : PRINT yn$
  IF yn$="L" GOTO LoadPic
  IF yn$="G" GOTO GetWidHgt ELSE GOTO GorL

  GetWidHgt:
  CLS : PRINT
  PRINT "Enter width (<";xmax+1;"),height (<";ymax+1;") of
                    plot"; TAB(tc);
  INPUT w,h
  IF w>xmax OR w<3 OR h>ymax OR h<3 GOTO GetWidHgt

  GetXrange:
  PRINT : PRINT " Enter X-range (lower, upper)"; TAB(tc);
```

```
   INPUT xr0,xrl
   IF xr0=xrl GOTO GetXrange
   x = FNmin(xr0,xrl) : xrl = FNmax(xr0,xrl) : xr0 = x
   xr2 = xrl-xr0

   PRINT
   PRINT " Do you want a picture aspect ratio
          of 1 (Y/N)"; TAB(tc); "? ";
   GOSUB GetAKey : PRINT yn$
   IF yn$="Y" THEN
     PRINT : PRINT " Enter Y center value"; TAB(tc);

   INPUT yc
   yr2 = h/w*xr2/asp : yr0 = yc-yr2/2 : yrl = yc+yr2/2
   PRINT " Y-range:  "; TAB(tc+1); yr0; ","; yrl
ELSE
  GetYrange:
   PRINT : PRINT " Enter Y-range (lower, upper)"; TAB(tc);
  INPUT yr0,yrl
  IF yr0=yrl GOTO GetYrange
  y = FNmin(yr0,yrl) : yrl = FNmax(yr0,yrl) : yr0 = y
  yr2 = yrl-yr0
  PRINT " Aspect ratio (Y:X) ="; TAB(tc+1);
          yr2/h*w/xr2*asp; ": 1"
END IF

 PRINT : PRINT "Function auto-ranging (Y/N)";TAB(tc);"?";
  GOSUB GetAKey : PRINT yn$
  IF yn$="Y" THEN
    GOSUB AutoRange
  ELSE
    GetZrange:
    PRINT
    PRINT "Enter (Z) range (lower, upper)"; TAB(tc);
    INPUT zr0,zrl
    IF zr0=zrl GOTO GetZrange
    z = FNmin(zr0,zrl) : zrl = FNmax(zr0,zrl) : zr0 = z
  END IF

  GOSUB OpenScreen    '-- Open plotting screen and window.
  GOSUB ReadPalette   ' -- Read in color palette.

  FOR i=0 TO 3          ' -- Make first 4 colors black, if '
                        -- not used.
    IF fc>i THEN
      PALETTE i, 0,0,0
      red(i) = 0 : grn(i) = 0 : blu(i) = 0
    END IF
  NEXT i

  xstep = xr2/(w-1) '-- X-increment per pixel (horizontal)
  ystep = -yr2/(h-1) '-- Y-increment per line (vertical).
  zr2   = zrl-zr0    ' -- Z-range.
  yy    = 0          ' -- Current plotting line.
  c     = nc/zr2*.99 ' -- Scaling constant.

  FOR y=yrl TO yr0 STEP ystep
    xx = 0              ' -- Current pixel in current line.
    FOR x=xr0 TO xrl STEP xstep
      PSET(xx,yy),INT(fc+(FNz(x,y)-zr0)*c):xx=xx+1:NEXT
    yy = yy+1
  NEXT y

  WaitKey:
  GOSUB GetAKey : k$ = yn$
  IF ASC(k$)>47 AND ASC(k$)<58 THEN

      pal = VAL(k$)   ' -- If key is a digit, change palette.
      GOSUB ReadPalette : GOTO WaitKey
    ELSEIF k$="S" OR k$="N" THEN
      GOSUB SavePic
      GOTO WaitKey ' -- 'S' or 'N' means "Save picture."
    END IF

    WINDOW 1 : PRINT
    WINDOW CLOSE 2 : SCREEN CLOSE 2 ' -- Otherwise, quit.
END

AutoRange:
    zr0 = 9.99E+37        ' -- Minimum.
    zrl = -zr0            ' -- Maximum.
    PRINT
    PRINT " Autorange: number of points to test"; TAB(tc);
    INPUT np
    np = FNmin(2000,FNmax(250,np)) ' -- Not < 250 or > 2000.

    FOR i=1 TO np
      z=FNz(xr0+RND*xr2,yr0+RND*yr2)
      zr0=FNmin(zr0,z)
      zrl=FNmax(zr l,z)
    NEXT

    z   = (zrl-zr0)*.02
    zr0 = zr0-z         '-- Adjust each end by 2% to be safe.
    zrl = zrl+z
    PRINT " Z-range ="; TAB(tc+1); zr0; ","; zrl
    GOSUB HitAnyKey
RETURN

ReadPalette:
    IF pal<0 OR pal>maxpal THEN BEEP : RETURN
    IF pal=0 THEN
      pal = paln       ' -- 0 means reverse current palette.
      pmode = (pmode=0)
    ELSE
      pmode = 0  '-- Other number means choose new palette.
    END IF

    ON pal GOSUB pal1,pal2,pal3,pal4,pal5,pal6,pal7,pal8,pal9
    READ nc            ' -- How many colors in this palette.
    IF nc>maxc THEN
      WINDOW 1
      PRINT :
      PRINT " Too many colors in
             Palette"; pal;" (max ="; maxc; ")."
      END             ' -- End program, but leave screen up.
    END IF
     fc = FNmin(4,maxc+1-nc)
     ' -- First color register used (usually 4).
     lc = fc+nc-1                ' -- Last color register used.

     FOR i=0 TO nc-1             ' -- Read in colors.
       READ r$,g$,b$
       IF pmode=0 THEN j = fc+i ELSE j = lc-i
       PALETTE j, FNdec(r$),FNdec(g$),FNdec(b$)
       red(j) = 15*FNdec(r$)
       grn(j) = 15*FNdec(g$)
       blu(j) = 15*FNdec(b$)
     NEXT

     REM -- Fill in the rest of the color registers
     REM -- with the last color.
     IF lc<maxc THEN
       FOR i=lc+1 TO maxc
         PALETTE i, red(lc)/15,grn(lc)/15,blu(lc)/15
       NEXT i
     END IF

     paln = pal          ' -- Save palette # for future use.
RETURN

pal1:  RESTORE Palette1 : RETURN
pal2:  RESTORE Palette2 : RETURN
pal3:  RESTORE Palette3 : RETURN
pal4:  RESTORE Palette4 : RETURN
pal5:  RESTORE Palette5 : RETURN
pal6:  RESTORE Palette6 : RETURN
pal7:  RESTORE Palette7 : RETURN
pal8:  RESTORE Palette8 : RETURN
pal9:  RESTORE Palette9 : RETURN

SavePic:
     WINDOW 1 : ern = 0 : PRINT
     IF k$="S" THEN
       ' -- Save picture using "Zpic?.ILBM"
       ' -- as name (? is version #).
       nam1$ = "Zpic" : nam2 = 0 : nam3$ = ".ILBM"
       WHILE ern <> 53
         nam2 = nam2+1     ' -- Increment file version number.
         nam$ = nam1$ + MID$(STR$(nam2),2) + nam3$
         OPEN nam$ FOR INPUT AS #1
         ' -- Try to open ?existing? file.
         CLOSE #1     ' -- Continue until "file not found."
       WEND           ' -- It's not there, so we can create it.

     ELSE
       ' -- Save file using name given by user.
       WHILE ern <> 53

       PRINT " Enter file name for picture
              (RETURN to cancel)"; TAB(tc);

       INPUT nam$ : PRINT
       IF nam$="" THEN WINDOW 2 : RETURN
       OPEN nam$ FOR INPUT AS #1
       ' -- Try to open ?existing? file.
       CLOSE #1
       IF ern<>53 THEN PRINT " File already exists." : PRINT
     WEND
   END IF

   OPEN nam$ FOR OUTPUT AS #1
   IF ern=53 THEN
     PRINT " Saving file: "; nam$
     ' -- If ern = 53, no further errors.
   ELSE
     PRINT "*** Could not open
            file: "; nam$; " for output ***"
     GOSUB HitAnyKey : WINDOW 2 : RETURN
   END IF

   WINDOW 2
   bpl = 5                          ' -- # of bitplanes.
   wl = INT(w/16+.999999)           ' -- Words per row in file.
   bm = wl*2*h*bpl    ' -- Number of bytes in bitmap to save.
   PRINT#1, "FORM"+MKL$(156+bm)+"ILBMBMHD"+MKL$(20);
   PRINT#1, MKI$(w)+MKI$(h)+MKL$(0);
```

```
' -- Image width, height, position.
PRINT#1, CHR$(5)+CHR$(2);      ' -- Bitplanes, masking.
PRINT#1, CHR$(0)+CHR$(0);      ' -- Compression, pad byte.
PRINT#1, MKI$(0)+CHR$(10)+CHR$(11);
' -- Transp-color, aspect ratio.
PRINT#1, MKI$(320)+MKI$(200);
' -- Page width, page height.
PRINT#1, "CMAP"+MKL$(96);      ' -- Color map.
IF fc>1 THEN
  PRINT #1,MKL$(160)+MKI$(-24416);
  ' -- First 2 colors: (0,0,0) (A,A,A).
END IF
FOR i=-2*(fc>1) TO 31
  PRINT#1,CHR$(16*red(i))
         +CHR$(16*grn(i))+CHR$(16*blu(i));
NEXT i
PRINT#1, "GRAB"+MKL$(4)+MKI$(w/2)+MKI$(h/2);
         ' -- 'Grab' handle (x,y).
PRINT#1, "BODY"+MKL$(bm);

' -- Save picture as uncompressed IFF ILBM
' -- (DeluxePaint 'brush' format).
FOR l=0 TO h-1                 ' -- For each raster line:
  GET (0,l)-(w-1,l), P%        ' -- Get one line of image.
  FOR i=3 TO 2+wl*5:PRINT#1,MKI$(P%(i));:NEXT i
  ' --Write 5 bitplanes.
NEXT l
    CLOSE #1
    WINDOW 1 : PRINT " ..picture saved."
    GOSUB HitAnyKey : WINDOW 2
RETURN



LoadPic:
    PRINT
    PRINT " Enter name of picture file
           (RETURN to cancel) "; TAB(tc);
    INPUT nam$
    IF nam$="" GOTO GorL
    ern = 0 : PRINT
    OPEN nam$ FOR INPUT AS #1 : CLOSE #1
    IF ern=53 THEN PRINT " File not found." : GOTO LoadPic
    OPEN "R", #1, nam$, 4
    FIELD #1, 4 AS f1$      ' -- Open file for random access.
    FIELD #1, 2 AS f2$, 2 AS f3$
    PRINT " Loading picture.." : PRINT
    GET #1, 1 : IF f1$<>"FORM" GOTO BadFFormat
    GET #1, 3 : IF f1$<>"ILBM" GOTO BadFFormat
    GET #1, 4 : IF f1$<>"BMHD" GOTO BadFFormat
    GET #1, 6 : w = CVI(f2$) : h = CVI(f3$)
    IF w<3 OR w>xmax OR h<3 OR h>ymax THEN
      PRINT "Bad picture width or height: ("; w; ","; h; ")."
      GOTO BadFFormat
    END IF
    GET #1, 8
    IF ASC(LEFT$(f1$,1))<>5
       OR ASC(LEFT$(f3$,1))<>0 GOTO BadFFormat
    GET #1, 11 : IF f1$<>"CMAP" GOTO BadFFormat
    GET #1, 37 : IF f1$<>"GRAB" GOTO BadFFormat
    GET #1, 40 : IF f1$<>"BODY" GOTO BadFFormat

    GOSUB OpenScreen : WINDOW 2 : CLOSE #1
    OPEN nam$ AS #1 LEN=1     ' -- Reopen file for color map.
    FIELD #1, 1 AS f5$
    GET #1, 48              ' -- Position in front of 1st byte.
    FOR i=0 TO 31
    GET #1 : r = INT(ASC(f5$)/16)
    GET #1 : g = INT(ASC(f5$)/16)
    GET #1 : b = INT(ASC(f5$)/16)
    PALETTE i, r/15,g/15,b/15
    red(i) = r : grn(i) = g : blu(i) = b
    NEXT i
    IF red(1)=10 AND grn(1)=10
       AND blu(1)=10 THEN PALETTE 1, 0,0,0
    CLOSE #1

    OPEN nam$ AS #1 LEN=2
       '-- Re-open file with 16-bit record.
    FIELD #1, 2 AS f4$

    GET #1, 82           ' -- Position before 1st data word.
    P%(0) = w : P%(1) = 1 : P%(2) = 5
    wl = INT(w/16+.999999)     ' -- Words per bitplane line.
    FOR l=0 TO h-1             ' -- For each raster line:
      FOR i=3 TO wl*5+2        ' -- For each word:
        GET #1:P%(i)=CVI(f4$):NEXT i
      PUT (0,l),P%,PSET        ' -- Draw one screen line.
    NEXT l
    CLOSE #1
    GOTO WaitKey

BadFFormat:
    CLOSE #1
    PRINT "*** Bad file format - load cancelled ***"
    GOSUB HitAnyKey
    GOTO GorL

OpenScreen:
    SCREEN 2,320,200,5,1
          ' -- Open display screen and window.
    WINDOW 2,"ZPlot",(0,0)-(w,h),1+2+16,2
    CLS
RETURN

HitAnyKey:
    WINDOW 1
    PRINT : PRINT " <Hit any key to continue>"
    GOSUB GetAKey
RETURN

GetAKey:
    WHILE INKEY$ <> "" : WEND     ' -- Empty key buffer.
    yn$ = ""
    WHILE yn$ = ""                ' -- Wait for next keypress.
      yn$ = UCASE$(INKEY$)
    WEND                          ' -- yn$ is the key pressed.
RETURN



ErrorRtn:
    ern = ERR                     ' -- Save error number.
    IF ERR=2 OR ERR=22 THEN
      PRINT : PRINT "*** SYNTAX ERROR: check FNz definition";
    ELSEIF ERR=4 THEN
      PRINT
      PRINT "** OUT OF DATA:check palette definition #"; pal;
    ELSEIF ERR=5 THEN
      PRINT
      PRINT "*** PARAMETER OUT OF RANGE: check
            FNz definition and ranges";
    ELSEIF ERR=11 THEN
      PRINT
      PRINT "*** DIVISION BY ZERO: check
            function definition and ranges";
    ELSEIF ERR=18 THEN
      PRINT
      PRINT "*** UNDEFINED FUNCTION: check FNz definition";
    ELSEIF ERR=53 THEN
      RESUME NEXT                 ' -- "File not found" error.
    ELSE
      ON ERROR GOTO 0 : RESUME
    END IF

    PRINT " ***" : PRINT
    CLOSE #1
    END

' ********************** PALETTES **********************

Palettel:
    DATA 28 : ' -- Monochrome
    DATA 0,0,0,0,0,0,1,1,1,1,1,1,2,2,2,2,2,2,2,2,3,3,3
    DATA 3,3,3,3,3,3,4,4,4,4,4,4,4,4,5,5,5,5,5,5,5,5,5
    DATA 6,6,6,6,6,6,6,6,6,7,7,7,7,7,7,8,8,8,8,8,8,9,9,9
    DATA A,A,A,B,B,B,C,C,C,D,D,D
Palett2:
    DATA 28 : ' -- Blue->Yellow
    DATA 0,0,1,0,0,2,0,0,3,0,0,4,1,0,5,2,0,6,3,0,7,5,0,8
    DATA 7,0,8,9,0,9,A,0,8,B,0,7,B,0,6,C,0,5,D,0,4,E,0,2
    DATA F,1,1,F,3,2,F,5,3,F,6,4,F,8,5,F,A,6,F,B,7,F,D,8
    DATA F,E,9,F,F,A,F,F,C,F,F,F

Palette3:
    DATA 28 : ' -- Brown->Yellow
    DATA 2,0,0,2,0,0,3,0,0,3,0,0,4,0,0,4,0,0,5,0,0,5,0,0
    DATA 6,0,0,6,0,0,7,0,0,7,0,0,9,1,0,B,2,0,D,3,0,E,4,0
    DATA F,5,0,F,6,0,F,7,0,F,8,0,F,9,0,F,A,1,F,B,2,F,C,3
    DATA F,D,5,F,E,6,F,F,7,F,F,A

Palette4:
    DATA 28 : ' -- Brown->Cyan
    DATA 2,0,0,2,0,0,3,0,0,3,0,0,4,0,0,4,0,0,5,0,0,5,0,0
    DATA 6,0,2,6,0,2,7,0,3,7,0,3,9,0,5,A,0,6,A,0,8,B,0,A
    DATA B,0,C,A,0,D,9,0,E,8,0,E,7,0,F,6,0,F,5,0,F,5,4,F
    DATA 5,6,F,6,7,F,7,8,F,8,9,F

Palette5:
    DATA 28 : ' -- Blue->Green
    DATA 1,0,3,1,0,3,0,0,4,0,0,4,0,0,5,0,0,5,0,0,6,0,0,6
    DATA 0,1,7,0,1,7,0,2,8,0,2,8,0,3,9,0,3,9,0,4,A,0,4,A
    DATA 0,6,B,0,6,B,0,9,C,0,9,C,0,B,C,0,B,C,0,D,C,0,D,B
    DATA 1,E,A,1,E,A,6,F,A,6,F,A

Palette6:
    DATA 28 : ' -- Blues (dark to light)
    DATA 0,0,0,0,0,2,0,0,3,0,0,4,0,0,5,0,0,5,0,0,6,0,0,6
    DATA 1,1,7,1,1,7,1,1,8,1,1,8,1,1,9,1,1,9,2,2,A,2,2,A
    DATA 3,3,B,3,3,B,4,4,C,4,4,C,5,5,D,5,5,D,6,6,E,6,6,E
    DATA 7,7,F,8,8,F,9,9,F,A,A,F

Palette7:
Palette8:
Palette9:
```

END

BY GRAHAM KINSEY

Amiga Public Domain Software

Just like any other computer, utilities make up a large portion of the Amiga's public domain library. Here are some of the most important public domain utility programs for the Amiga.

For each program, the author is given and whether the program is available on the Fish or AMICUS series of public domain disks. The number of each series is given before the description. In many cases, more than one disk will be listed in each series for a given public domain program. This means that an update to that public domain program has been released. I will not try to keep track of which programs are available on PeopleLink here since virtually all of the time the programs mentioned in this column will be available on PeopleLink's Amiga Zone by the time this column is published. When a public domain program has been classified as Shareware, this is also noted, with the suggested donation.

Emacs: by Dave Conroy
(Fish 2,6,22; AMICUS 2,9)

One of the oldest public domain programs out for the Amiga, this is a port of an old text editor that is well known by many IBM and Unix users. Those who have used it before will find it easy to adjust to this one. One of the good things about Emacs on the Amiga is that there are many different versions out, each with different features. Some support menus, some have word wrap, some are suited to word processing; others are meant to be used strictly for text editing. And if you are unpleased with the versions out there, if you have either Lattice C or Aztec C, you can compile your own version, picking only the chunks of source code that add the features that you want to use.

Disksalv: by Dave Haynie
(Fish 20; AMICUS 8; Shareware: $10)

This is one program that you can't afford to be without, for this is perhaps the only program that can fix a damaged file or disk. In addition to salvaging a corrupted disk, Disksalv will attempt to salvage each file, and each directory and subdirectory, unlike Diskdoctor (which is one of the new programs in the 1.2 Enhancer package), which will only salvage a disk, not a file. Even if Disksalv cannot salvage a particular file, it will copy the blocks from the file that it can read and put all these block together in a special place, so that you can attempt to piece together the file later on your own using a low-level file editor. Disksalv even creates a separate directory for the leftover blocks. Disksalv will only work with two drives, and if your disk was full to begin with, then Disksalv will need two disks for the salvage process.

MyCLI: by Mike Schwartz
(Fish 4; AMICUS 9)

Many programmers have attempted to write a program that replaces the standard CLI with a custom version of their own. MyCLI was one of the first attempts. MyCLI's commands are totally RAM resident—you never have to keep a disk with all of the commands in a drive at all times. MyCLI has a default list of CLI commands that it loads into RAM, but the list is user-definable. You can assign one of the function keys to a certain command for easy access. MyCLI also displays the time and date at every prompt.

PopCLI: by John Toebes
(Fish 35,40; AMICUS 12,15)

This program does two simple yet important things. First, it allows you to run a new CLI at any time, even if you have no normal way to input a command. For example, if you don't have Workbench up and your CLI is occupied by a program that you don't want to get rid of. Second, if you don't touch the keyboard for a certain length of time, PopCLI will automatically blacken the screen, preventing a burnout of the phosphors on your monitor. In addition to polling the keyboard, PopCLI also polls the mouse/joystick inputs, so PopCLI won't suddenly black out the screen while you're playing a game. The default time for PopCLI to blacken the screen if there is no input is two minutes, but this is redefinable at run-time.

Dirutil: by Nick Nicotra
(Fish 35,40,49; AMICUS 11)

This program is another replacement for the CLI. Dirutil is intended for the Workbench fans out there—it is loaded with gadgets. Many of the AmigaDOS commands do not have to be typed in when running Dirutil, because there is a gadget associated with each command. There are gadgets for such vital AmigaDOS commands as type, makedir, run, delete, copy and rename. When you want to search the directory of a device, there are gadgets for df0: through df3:, a ram: gadget, and there are even dh0:, dh1:, and dh2: gadgets for those who have hard drives. There are parent and root gadgets available, for when you are deep within a device's directory tree and want to work back towards the top level. In addition to the normal type command, there is a Htype command for when you want to view a binary file as hexadecimal values. When either the type or Htype gadgets are clicked, Dirutil will open its own text display window and close it when you are done looking at the file. There is even a show gadget, so you can look at IFF pictures while running Dirutil. In the early versions of Dirutil you had to supply your own display program, but when version 4.0 of Dirutil was released the IFF display program was added to the Dirutil code. The show program provided with Dirutil version 4.0 and later will even display Hold and Modify pictures, if the HAM pictures are in the IFF format. Dirutil takes advantage of the fact that there are four available colors within AmigaDOS, and it uses extra colors for things like highlighting directory names when you are looking at a disk.

Kickbench: by Alonzo Gariepy
(Fish 36)

Do you ever get tired of inserting your Kickstart disk on power-up? Well, Kickbench will allow you to copy the Kickstart code onto a normal Workbench disk, then let you to use the disk as both a Kickstart and a Workbench disk. Once this Kickbench disk is properly prepared and armed, when you boot your Amiga, the Amiga will recognize the disk as a Kickstart disk, then load the Kickstart code. When the Kickstart code is loaded, the Amiga will then recognize the Workbench part of the disk and proceed as if it was a normal Workbench disk. The only thing that you must do is to rearm the disk once the Workbench part has loaded if you want to reuse the disk again to load up the Kickstart code later. Rearm-

ing is done by running a command called kick, which is supplied with the file.

Arc: by Raymond Brand
(Fish 40; AMICUS 8; Shareware: $35-50)

If you ever plan to download or upload files to or from an Amiga BBS or an on-line service that contains Amiga files, this program is a necessity, since compressing files with this program is the standard for Amiga telecommunications. The Amiga version of Arc originated from the IBM version, and is still compatible with the IBM one. The benefit of this compatibility is that Amiga owners can unArc IBM archives. Of course Amiga owners won't be able to run an IBM program file as is, but you will be able to read any text and source files. The bad part of the compatibility is that all files to be archived with the Amiga version of Arc must have names no longer than 12 characters. The author has promised an update that will alleviate this problem.

Decigel: by Thad Floryan
(Fish 18; AMICUS 9)

Hardware-wise, there is no reason why you cannot replace the 68000 in your Amiga with a more powerful 68010. But there is a software problem that results from this upgrade—a few programs use an instruction that is valid for a 68000, but illegal with the 68010. Decigel is the answer to this software problem. When Decigel is running, it will create a wedge for any problem that normally would try to execute the illegal instruction, so that it will still run, but not crash the machine. So go ahead, install a 68010, and enjoy up to a 50% performance increase in math intensive programs.

PM: by Dale Luck (AMICUS 11)

This program gives you an easy way to monitor graphically how busy your Amiga is. Three graphs that are plotted as percent access vertically and time horizontally give you this information. The first one monitors the 68000, while the other two monitor how often chip and fast memory is being accessed. There is limited ways to change the update rate.

AmigaMonitor: by Jim Voris
(Fish 40; AMICUS 15; Shareware: $15)

This program monitors just about every part of your Amiga. It will tell you simple things like how much memory is available and what directories and files are available. It also gives you information that you wouldn't normally expect, like what software devices are available to use (like the narrator device), and whether any tasks have executed an interrupt. Perhaps the most intriguing part of this program is the option to monitor all active tasks. You would expect to see only one task when you aren't multitasking, but when you run this program, you will see several tasks, including a trackdisk device and file system tasks for each drive, an input task and a CON task for each CLI that is running. For each task that is running, AmigaMonitor will display whether the task is running or waiting for an event to occur, and the priority of that task. AmigaMonitor also allows you to view any area of memory, in either byte, word or long word format. These features are just part of the range of options available in AmigaMonitor.

Ramspeed: by Perry Kivolowitz
(Fish 31)

This program is not quite as vital as it used to be, but this is not bad in itself. Last year, when the first external memory boards were coming out for the Amiga, some of the boards being produced had been slowed down by wait states in the design of the memory board. This is not necessary, and is really a terrible thing, for many people soon found out that their external RAM, which should be faster than the Amiga's internal memory, was actually running slower than the internal memory. Back then this program could be used to test whether wait states might have been designed into your particular memory board. Fortunately, today none of the boards now available have any wait state problems. But you still might want this program to check out whether there is a slight speed difference between two given memory boards. When the program executes, all comparisons are made relative to the internal memory, so that if you want to compare the internal memory speed of two Amigas, you will need an external memory board to have something to compare to.

Xicon: by Pete Goodeve
(Fish 31)

Do you still love the Workbench, but upset that you can't do plenty of things from Workbench that you can do in CLI? Well relax, programmers out there are working on beefing up the Workbench environment. Xicon is an example of such a program. Xicon will allow you to execute an AmigaDOS batch file without ever having to open up a CLI. An input window will be automatically opened for the script file, although if you don't want such a window, than you can state so by editing the ToolType string gadget of the icon. If you like, you can even run more than one of these Workbatch programs at once, via extended selection from Workbench. One warning, the window that is brought up will not have a close gadget attached to it, so the only way to close it is to hit Control C or Control D.

Fixhunk: by D.J. James
(Fish 36; AMICUS 16)

For those Amiga owners who have extended memory (more than 512K), Fixhunk is very important. Many programs were not designed with extended memory in mind, and when they try to execute with extended memory, they will often crash or execute improperly. The problem is the fact that data that has to do with the graphics and sound three-chip set must be loaded into chip memory. But unless the program specifies where each hunk of data must go, the Amiga will try to put all data into fast memory. Fixhunk alters the actual program, so that all data hunks that should be loaded into chip memory will not be inadvertently loaded into fast memory.

Newzap: by John Hodgson
(AMICUS 16; Shareware: $15)

Newzap is based on Filezap, by D.J. James (Fish 10,14). Like Filezap, its predecessor, it is a file editor, allowing you to edit any type of file, text, object, executable, or anything else you can think of. This is useful in that a normal text editor is not prepared to edit binary files. You may need to make changes in a binary file sometime, and without the source in your possession, this editor is what you need. One reason why you may want to do such editing would be when you want to change some of the default settings in a program. Newzap's added features over Filezap include a search function, which will hunt down either text strings or hexadecimal values.

Shell & Csh: by Matt Dillon
(Fish 14,24,36,41,48; AMICUS 2)

Csh, formerly referred to as Shell for

good reasons, is another CLI replacement. But this one is designed for the power users—those who want more meat and less bun in their command interpeters. Those who use Unix will welcome this program. The latest version (version 2.04) offers such powerful features as a help command, histories, aliases, piping and true wildcarding (instead of AmigaDOS's pattern matching). Csh also has its own script file command set, with many added commands like sleep, mem (displays free memory, both chip and fast), and forever.

Enough: by Bruce Barrett @ Commodore Amiga
(Fish 29)

Simply put, when the command ENOUGH is executed from a standard Amiga-DOS batch file, it checks to see whether you have it or you don't. Enough can check to see if a certain amount of memory is present. It can check to see if a device is present like an external floppy or a hard drive by finding out if a df1: or dh0: device is present. Enough can also check to see if a particular disk, directory or file is present. More than one check can be made; you can even make more than one check per each ENOUGH command, which is handy for conditional branching.

Pr: by Bob Leivian
(Fish 34)

With a multitasking system, print spoolers are not quite as vital as on unitasking systems, but they are still useful. This one has some nice added features, such as wildcards and printing control characters in the ↑ format. If your printer has a letter quality option, there is a command to invoke that option.

Tracker: by Brad Wilson
(Fish 35; Shareware: $5)

This program allows you to send the contents of an entire disk as a single file via modem to someone else. There are two reasons why you might want to do this. First, this is an easy way to transmit a Kickstart disk over the phone, should you need to do so. I am sure that a few people were using this program while all those beta version of 1.2 were floating around the world. The second reason would be if you had a disk that had a large number of directories and sub-directories, and you wanted to keep the directory structure intact. You can break up the group of outputed files into smaller pieces, by only reading a few tracks of the disk at a time.

Newstat: by James Synge
(Fish 38)

Newstat is a replacement for AmigaDOS's Status commands. In addition to the information Status tells you, Newstat will also tell you the priority of each task, and the address in memory where it is running. It also tells you from which directory the task came from.

Areacode: by Bill Beogelein
(Fish 40; Shareware: amount not specified)

When run, if you give this program an area code, or LATA, it will tell you the state and locality (if applicable) that the area code covers.

DOSHelper: by John Youells
(Fish 40; Shareware: $10)

This program is properly named, for when it is run it will let you call up a help screen for each AmigaDOS command. Commands are grouped into four categories: system, batch, file and miscellaneous. This program does not include help for the new commands that have been added under version 1.2 of AmigaDOS. The help screens are stored as a text file, so that it does appear that you can edit the help screens to suit your own taste, but if you want to add new help screens, you will have to go edit the C source code (which is provided), and then re-compile the program.

PagePrint: by Phil Mercurio
(Fish 40; Shareware: $10)

This program will print out text files while adding certain information to the printed copy. Pageprint can add date and time stamps to a file. It can add line numbers to the printout, with the increment definable at run-time. It can also add a copyright notice to each page as a footer. Unfortunately, if you want to put in your own name in the copyright notice, you will have to edit the C include file, then recompile the program.

SpriteClock: by Dariel Schneider
(Fish 43)

There are literally dozens of different public domain clock programs out for the Amiga. The only thing that makes this clock program special is that it is displayed via a sprite. This means that the SpriteClock will always be in the front of the screen. This could be annoying in that a portion of the screen would always be blocked. However, this isn't a problem since the clock is only displayed when the time changes (once a minute).

CheckModem: by Matt Dillon
(Fish 46)

This program will execute an AmigaDOS startup-sequence batch file if and only if a modem is hooked up to the Amiga. This could be especially useful to those who have another device that hooks up to the serial port, and the device has a startup-sequence associated with it.

Myupdate: by Joe Mueller
(Fish 49)

When version 1.2 of the operating system was released, many people wanted an easy way to update their old version 1.1 disks. A program that could replace the old versions of updated programs with the new versions would be a great help. Myupdate is such a program. Myupdate will replace old versions of programs with the newer version, but it has no intelligence, so that it will not know which version is the update. Myupdate is an improvement of a similar program from Commodore-Amiga called Update. Myupdate's advantage is that it can strip C header source files of comments and unnecessary whitespace, so that it is also extremely useful to C programmers.

QMouse: by Robert Rethmeyer
(Fish 49)

For those who have tried to write their own custom startup-sequences, QMouse allows you to program in something that you could not use previously: input from the user. Normally you can add input to an AmigaDOS batch file via parameters, but this type of input is not possible when a startup-sequence file is being executed. QMouse allows you to insert a conditional branch within your startup-sequence file, the condition being whether the left mouse button is being held down.

ARCre: by John Hoffman
(Fish 53)

Earlier when I was discussing the file compression program Arc, I mentioned

that because the present version program of Arc is still compatible with the IBM version, files to be Arced must have names that are no longer that 12 characters. ARCre is an external solution to this problem. When ARCre is given a set of filenames, ARCre will create two AmigaDOS batch files. One can shorten down the names of the files, so that they can be easily Arced. The other batch file can rename the files to their original name once they have been dearced.

UUencode: by Mark Horton
(Fish 38,53)

This program will take a binary file and create a version that is text only. You might want to do this if you want to transmit a file by mail and don't want to risk sending a disk that could get damaged or magnetically erased. This would also be useful for modem transmission when the only available protocol that both the host and your terminal program both support is ASCII. The file size of the text only version will be about 35% larger than the binary version.

ASDG RRD: by Perry Kivolowitz and ASDG Inc.

It is one thing to be able to have some extra memory in your Amiga, but what matters is how reliable that memory can be. What happens if while you're multitasking, one program just happens to crash on you? All the other programs that might be running in memory will also be lost when the the machine is reset. When you create a RRD, short for RAM Recoverable Disk, any files or programs that are loaded into it will be protected from erasure when you reboot your machine. You do not have to own an external memory board to take advantage of this program. The RRD will work with just the 512K internal memory inside your Amiga.

Blitz: by Hayes Haugen
(Shareware: $10)

This program can display a text file. But Blitz's power come from not what it can do, but how. The most starling feature of Blitz is the lightning-fast text display rate. Blitz has perhaps the fastest text display rate of any Amiga program available, public domain or commercial. Blitz has other nice features. For example, you can run Blitz in the background and call it up at anytime via a hotkey. Blitz can strip the high bit off of all the characters, which can help to fix garbage that was the fault of line noise during a phone transmission. You can sync the display rate of text to the video display, which gives the appearance of smooth scrolling. You can also call up a new CLI at any time. For those who don't have much memory to spare, Blitz gives you all these features for a measly size of 17K of data.

RamOFF_On: author unknown

As I mentioned previously in the review of Fixhunk, some programs will not work with extended memory. If you don't have the time to change the program, RamOFF_On is the easy way out. Simply put, RamOFF_On will effectively turn off (or turn back on) any extended memory that been installed in your Amiga.

Uedit: by Rick Stiles
(Shareware: $25)

Uedit is a unique program, in that this program was formerly a commercial product, but now Rick Stiles has decided to release the product as shareware. There is a strong incentive to send the shareware fee in, for if you do you will receive a 100-page manual, plus the option to send in additional checks for major add-ons to the program. As for the program itself, Uedit's big feature is its programability, for you can reprogram everything about Uedit, including the intuition menus and gadgets associated with the program. You can even do this reprogramming while you edit, via Uedit's command language. And for those who just want to be able to use Uedit as quickly as possible, Uedit's Learn mode allows you to automate just about any command or feature of editing that you can imagine, so that you can get your editing job done as fast as possible.

Keep in mind that many of these programs may have been updated since I wrote this column. The public domain environment is constantly changing, so always be on the lookout for updates to your favorite programs, especially for the most popular utilities. Next month I will get into graphics demos and programs for the Amiga. We all know that the Amiga graphics are outstanding, but which programs really let it shine? You'll find out in the next installment of this column. ■

Continued from pg. 22

study the health of each person in eight different ways.

Wasatch center also offers unique material. It specializes in presenting genealogical graphs and diagrams beginning around the year 2010. History and Geography supply information about these two topics, while Scitech delivers science and technology reports as they become available. Med10 offers files of general information about medicine and medical problems of the future.

The two final data spaces, Military and Psilink, contain important top secret documents that the public has little or no knowledge about. Military files usually consist of priviledged information about acts of war and weapons, while Psilink contains a series of forbidden files offering new data that helps to explain many of the complex situations which arise in the story.

The graphics of *Portal* are original and entertaining, but somewhat simple in nature. There are a few outstanding exceptions, however. I was very pleased with the opening sequence of the program because it gives you a quick look at a series of diagrams and drawings that become important as you progress into the scheme of the story. Bizarre sounds complete this unique presentation which resembles the opening sequence of a movie.

The graphic transition from displaying the icon interface to showing the inside of a data space uses an interesting transformation sequence. It is smooth, linear and a pleasure to watch. File pictures and diagrams are black and white with some details. These drawings support the story very well, but large numbers of them in the program limited the amount of detail the programmer could add to each picture.

Portal's sounds are also very original, but the catalog of noises is very small considering the fact that the program is five disk-sides long. Certain sounds tend to become monotonous after a while.

Portal doesn't resemble any existing computer game and it shouldn't be judged as one. The program is a novel in software form. Think of *Portal* as the pages of a book ripped from its binding. The user holds page one in his hand and throws the remaining pages high into the air. Your task is to reconstruct the book page by page. ■

Continued from pg. 34

enough without turning to a life of panhandling, at the end of the 91 week course all of your assets are converted into cash and your report card is due. Chances are that you will not accumulate your million dollars in one play session. If things are going well, you may elect to save your current game status to keep the ball rolling in a new market environment. And if things are running less smoothly, you can simply drop out of existence and start anew with an unblemished record. If only real life were this easy.

The *Millionaire* game screens are simple but functional. Graphs, charts, reports and portfolios are all displayed in a straightforward, unembellished style. But with most of the game's drama actually taking place off-screen in some fictional financial world, these displays are really only acting as informational updates, and their simple design is quite appropriate. The contest has no audio backdrop at all, but after a few winning rounds you'll swear you hear the incessant clicking of a ticker tape machine, occasionally followed by some spontaneous cheers from the market floor. In fact, those shouts you hear may not be imagined, for with this program's ability to hold up to 14 players' data on disk, there's apt to be some sizeable crowds gathered around your computer.

Millionaire is the perfect mix of education and recreation, a simulation that can actually help develop a sense of investment timing. That is not to say that someone should or could go right from the keyboard to the Big Board without worry, but this game does offer players a true taste of reality in the market world, including all of those commissions, taxes and interest payments just waiting to take a bite out of your profit pie. And all of this nail-biting ulcer-churning excitement can be yours without the risk of personal bankruptcy.

Millionaire is one entertainment investment you can't afford to miss. ■

Stock Aid

Playing Without Paying

Investing in the stock market is risky business. An uninformed dabbler can easily lose a quick bundle if he doesn't watch his financial steps very carefully. There's no better instructional course to demonstrate this hard fact than a couple of rounds of *Millionaire.*

But by studying trends, watching news items, and learning from mistakes, one can also learn some of the proven ways to minimize the hazards of the market. The section of the user's manual entitled Game Strategy is of particular interest in this area. It will help you get started along your road to success. Below, I've also listed a couple of additional tips that are sure to help the novice gain some desired confidence and cash.

In order to acquire some knowledge about market happenings, Blue Chip advises newcomers to get the feel of their surroundings by sitting through the first few weeks of *Millionaire* play without making any actual transactions. That's a valuable piece of advice that could even be taken a step further. When you finally do decide to plunge into the investing scene, I suggest that you initially concentrate your stock market purchases to a single industry group of your choosing. Odds are that this orientation method won't have you swimming in heavy profits, but by limiting your scope in this fashion you will give yourself the chance to gain some experience in a smaller area with limited distractions. Then, once you're feeling more comfortable, you can expand your foundation little by little.

Aside from the money kept in reserve for interest charges and potential margin calls, it pays for the experienced player to invest every last cent he has to provide himself with as much leverage as possible. This is the only way to win the game. Unlike the real world, where money can earn interest in various savings oriented investments outside the market, money left in Millionaire's cash column collect nothing but dust. As the saying goes, "Nothing ventured, nothing gained."

Don't underestimate the far-reaching effects of the current events listed in the Financial Journal reports. Not only will these happenings have an immediate impact on the company or industry specifically mentioned in the news item, but their shock waves can still hold some power several weeks down the line—even in areas outside the industry group. Every effect has a cause, and you can increase your investing know-how by tracing all dramatic market moves back to their source. Remember, nothing happens by accident. ■

THE PAWN

Continued from pg. 28

having to laboriously edit your own input time after time because of a typo. *The Pawn*'s screen editor minimizes that frustration. On the negative side, however, the game does not include an option which allows the reader to dump the game text to printer.

Speed is always a concern when playing a complex adventure game since most must access the disk drive to update their memory bank after each user's input. Because the storyline is of epic proportion, your disk drive will get a real workout while exploring Kerovnia, and your patience may be tested a bit by the frequent pauses. But to be fair, the updates are less objectionable when the game is played in text-only display mode since the game appears to use a disk turbo loader to speed access times. When graphics are added to the display, the disk access delays are more frequent and longer. I found I could minimize this problem by toggling between modes, selecting graphics only when I was exploring new territory.

A welcome inclusion in *The Pawn* is a short pre-adventure textbook which sets the stage for your adventure. Included in the 56-page book is an appendix which offers hints and clues to help you if you get stumped somewhere in your exploration. The clues are protected from the casual reader by cypheric code. Remember those old decoder rings you use to get in Cracker Jacks™ where one letter substituted for another? Well, *The Pawn* clues are coded too, so you can't just read them, you must decode them first. This is not difficult since the program will do it for you, but it does prevent a user from just turning to the back of the book and zipping through the adventure effortlessly. I found the inclusion of the clues a security blanket and the protection scheme fun.

The critique of any program hinges upon one consideration—is the program worth the price the distributor is asking. If you enjoy good adventure, you'll like *The Pawn*. If you've never played a text adventure before, this one is an excellent one to begin on. That is not to suggest that *The Pawn* is an entry level game. It is not. But the game is easy to control, is logically designed, and the inclusion of clues means no need to walk away from this one in frustration. So to answer the question: yes, in my opinion *The Pawn* is an adventure worth exploring. ■

CROSSCHECK

Continued from pg. 38

than blank squares, but more importantly, when you place a letter over them you are awarded another turn. This fact can serve the player well since a word which, because it is either too short or too large or has the wrong letters, can't help you construct your chain may still be usable over a diamond square. The trick is this—if you put the word on a diamond square, you get another turn and a chance to uncover a word which will help you win.

The time required to play a round of *Crosscheck* is dependent upon the speed of the players. An average game between two to four players can last as little as a quarter of an hour to as much as several days. For those who get really involved in a round with *Crosscheck*, there is an option to save a game in progress. This means no one need lose a job because you can't tear yourself away from the game. And because the game's save option allows up to ten games to be saved on a single disk, the whole family can be playing different versions of the game simultaneously.

I do have one complaint about the save option. Save is summoned by pressing the F3 key. Unfortunately, the F1 key next to it is used to restart the game, so players must be sure when they reach for those keys not to accidentally erase the active game board by pressing the wrong function key. (Of course, if you are being beaten badly and want to accidentally tip over the board, you might be able to escape from a determined opponent with this innocent slip of the fingers. On the other hand, you might get your fingers broken by your determined opponent if you try the trick too often.)

One feature missing in *Crosscheck* is a difficulty level selection. Without the option, there is no way to handicap players with different abilities. This means if an adult competes with a 12-year-old, both will draw words from the same dictionary source which would (normally) give the adult an advantage. A choice of levels would make it possible for different players with different abilities to compete. Normally, I like to play word games with my children for two reasons. First, there is always a chance they will benefit from the educational values of such games, and second, they serve as an excuse for the family to get together and enjoy a shared interest. Because of the absence of difficulty levels, I played *Crosscheck* with only my wife.

The game disk is warranted to be error-free for 180 days (twice the normal limit) and backup copies can be purchased directly from Datasoft for $7.50. They also market clue disks so once you master all the clues on the program disk, you can start fresh again. The library disks include clues for either adults or children and retail for $14.95. ■

Hints

Because *Crosscheck* is a brain game and not a reaction game, there are few tips to offer other than memorize your dictionary. But because strategy is very important to winning, there are a few things you can do to increase your chances.

Practice throwing the screen die. If you can accurately judge when to press the spacebar to return the number you need, you are half way to winning. There is nothing more frustrating than having a three-letter gap in your chain and roll only nines.

If you get a word that is unusable in your chain, don't pass until you examine the entire board. If you can place the word anywhere on the board over a diamond block, you will not only get a few bonus points, but be awarded another turn. This can go on until you cover all the diamonds or get the word you need.

Remember that *Crosscheck* allows you to rotate the word in any of four directions before placing it on the screen. This means you can reverse the sequence of the letters and make almost any word playable.

The block option is wonderful to frustrate an opponent. Sometimes you are wiser to position a block in your opponent's path than place a word in your chain. But be sure the block is worth sacrificing a turn for before tossing the die. And just as importantly, remember that once a block is placed you cannot cross it either. Therefore, it is usually smarter to position the blocks near your opponent's home base rather than the starting point.

While individual blocks are good, in a pinch you may be able to block your opponent with words, since to cross it they have to wait for a word with similar letters. But be careful with this strategy since the letters may serve him just as quickly. ■

VOICE MASTER

Continued from pg. 44

The techniques of speech synthesis have been fairly well mastered. Soon (if not already) your car will tell you when the oil is low and your microwave will ask you to dinner. But low-cost speech recognition is a pioneering field. Voice Master can recognize a vocabulary of up to 32 different words or sounds of no more than two seconds each.

To program voice recognition, the command TRAIN N creates what the manual calls a template of the sound. According to Bradley Stewart, Covox program designer, the heart of the system is a patented method of analyzing sound. Like all computers, the Commodore-Voice Master combination digitizes sound. This means it measures the amplitude and frequency of the sound waves and saves the results as a series of numbers. Since sound waves change thousands of times a second, a few seconds of sound creates thousands of numbers. It's like describing traffic on an LA freeway by numbering each car and recording every time it changes position. The good news is that this method is very accurate. The bad news is that in a few seconds your computer is swamped to the ROM with numbers. Obviously, some compromise is in order.

Sound waves can be described by complicated equations known as Fourier transforms. While these equations have been around for years, they involve so many calculations that only special chips can take the load. Specialized chips are very expensive, which is why voice recognition has been associated with racing yachts and sky blue Mercedes. Stewart says Covox has found a way to do these calculations with standard, and very inexpensive, chips plus the 64's own 6510 microprocessor. After processing, each sound template is stored as a series of 12 numbers. Just 4,000 bytes of memory stores all 32 templates.

To program for speech recognition, you first create the templates using the TRAIN N command, with the N ranging from 0 to 31 (speech created with LEARN can be spoken, but not recognized). Like LEARN, TRAIN prints a question mark prompt which spins when a sound is detected. In practice, some care is needed to avoid background noise. Voice Master recognizes sounds, not words. If a door slams while you are training it to recognize "Berger the Barbarian," then you'll have to say "Berger the (Slam!) Barbarian" from then on.

To recognize a sound, the command RECOG causes the 64 to pause and show a prompt. If a sound is detected, the 64 searches for the best match in memory. If a match is found, the index number of the recognized word is placed in memory location 151. Thus, if "Berger the Barbarian" has been trained as word number one, the following program segment will recognize his name.

```
100 RECOG
110 WORD=PEEK(151)
120 IF WORD=1
    THEN GOSUB 1000
```

The subroutine at 1000 would contain something appropriate for Berger and his barbarian buddies.

Using RECOG is very similar to using GET or INPUT, except the input comes through a microphone rather than the keyboard. Since searching through all 32 templates takes several seconds, the programmer can speed things up by placing the most used words at the front of the list. Also, Voice Master divides the 32 templates into four sets of eight words. By using an index number from 1 to 4, you can restrict the search to just one group. The command BLANK drops a word from the list, UNBLANK brings it back. Skillful programming can cut recognition times considerably. With about a half hour's practice, I got the proper recognition about 70% of the time. Practice is a factor. Covox claims 90% is possible.

The Voice Master manuals (the Composer manual is printed separately) are clearly written and contain several programming examples. They do include a useful memory map for advanced BASIC programmers. Like most software manuals, it does have faults. First, and worst, there is no index. Second, it does assume familiarity with Commodore BASIC. There is no special section for beginners. Third, as everyone knows, there exists a computer manual fairy who magically prevents logical organization in all manuals. Otherwise, how can you explain why instructions on plugging in Voice Master don't appear until page 9 in a section titled "Earphone"?

All carping aside, the Covox Voice Master offers great performance at the price. It's indispensible for an educated 64 who wants a little intelligent conversation. ■

HOW TO ENTER PROGRAMS

The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN,RIGHT2] would mean to press the cursor-down key once and then the cursor-right key twice. Note: Do not enter the commas.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHIFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The following chart tells you the keys to press for any word or words inside of brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to the keystrokes shows you what you will see on the screen.

Syntax Error

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "?Syntax Error Break In Line 270," type LIST 270 and press RETURN. This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parentheses. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the wrong line to look at. If the line the syntax error refers to has a function call (e.g., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

Illegal Quantity Error

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X...). This error is telling you that this variable is out of range. If the variable is being read from data statements, then the problem is somewhere in the data statements. Check the data statements for missing commas or other typos.

If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.

Out Of Data Error

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

Other Problems

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long and the 128 a line up to 160 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than the standard number of characters on one line.

"[HOME]" = UNSHIFTED CLR/ HOME
"[CLEAR]" = SHIFTED CLR/HOME
"[DOWN]" = CURSOR DOWN
"[UP]" = CURSOR UP
"[RIGHT]" = CURSOR RIGHT
"[LEFT]" = CURSOR LEFT
"[RVS]" = CONTROL 9
"[RVOFF]" = CONTROL 0
"[BLACK]" = CONTROL 1
"[WHITE]" = CONTROL 2
"[RED]" = CONTROL 3
"[CYAN]" = CONTROL 4
"[PURPLE]" = CONTROL 5
"[GREEN]" = CONTROL 6
"[BLUE]" = CONTROL 7
"[YELLOW]" = CONTROL 8
"[ORANGE]" = COMMODORE 1
"[BROWN]" = COMMODORE 2
"[L. RED]" = COMMODORE 3
"[GRAY1]" = COMMODORE 4
"[GRAY2]" = COMMODORE 5
"[L. GREEN]" = COMMODORE 6
"[L. BLUE]" = COMMODORE 7
"[GRAY3]" = COMMODORE 8
"[F1]" = F1
"[F2]" = F2
"[F3]" = F3
"[F4]" = F4
"[F5]" = F5
"[F6]" = F6
"[F7]" = F7
"[F8]" = F8
"[POUND]" = ENGLISH POUND
"[SHFT ^]" = PI SYMBOL
"[^]" = UP ARROW

GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,COMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPITITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

HOW TO ENTER PROGRAMS

You can enter these lines by abbreviating the commands when you enter the line. The abbreviations for BASIC commands are in your user guide.

If you type a line that is longer than the acceptable number of characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed (without a line number). Many people write that the computer gives them a syntax error when they type the line, or that the computer refuses to accept a line. Both of these problems are results of typing a line that has too many characters.

The Program Won't Run!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is "running." Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

If All Else Fails

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program. The user group may also have the program on a library disk and be willing to make a copy for you. For $9.95 per issue, you can also get all the BASIC programs in each issue, as well, from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your errors and increase your understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

The name of the program
The issue of the magazine it was in
The computer you are using
Any error messages and the line numbers
Anything displayed on the screen
A printout of your listing (if possible)

All of this information is helpful in answering your questions about why a program doesn't work. A letter that simply states "I get an error in line 250 whenever I run the program" doesn't give us much to go on. Send your questions to:

Commodore Magazines
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

The Magazine Entry Programs on the next pages are two BASIC machine language programs that will assist you in entering the programs in this magazine correctly. There are versions for both the Commodore 64 and the Commodore 128. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 49900 (4864-5545 on the 128) and just lets you know that the program is running. If everything is ok, the program will finish running and say DONE. Then type NEW. If there is a problem with the data statements, the program will tell you where to find the problem. Otherwise the program will say "mistake in data statements." Check to see if commas are missing, or if you have used periods instead of commas. Also check the individual data items.

Once the program has run, it is in memory ready to go. To activate the program type SYS49152 (SYS4864 on the 128), and press RETURN. You are now ready to enter the programs from the magazine. To disable the Entry Program, just type KILL (RETURN) on the 64 or SYS4867 on the 128.

The checksums for each line are the same for both the 64 and 128, so you can enter your 64 programs on the 128 if you'd like.

Typing the Programs

All the BASIC program listings in this magazine that are for the 64 or 128 have an apostrophe followed by four letters at the end of the line (e.g., 'ACDF). If you plan to use the Magazine Entry Program to enter your programs, the apostrophe and letters **should** be entered along with the rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it **does not** enter that line into memory. This makes it impossible to enter a line incorrectly.

Error Messages and What They Mean

There are five error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

Continued next page

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

NO CHECKSUM: This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

QUOTE: This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

KEYWORD: This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT. .) incorrectly. Check the line in the magazine again and check your spelling.

OF CHARACTERS: This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

UNIDENTIFIED: This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word misspelled. Check the line in the magazine again and correct the mistake.

MAGAZINE ENTRY PROGRAM—64

The Magazine Entry Programs are available on disk, along with the other programs in this magazine, for $9.95. To order, contact Loadstar at 1-800-831-2694.

```
10 PRINT"[CLEAR]POKING -";
20 P=49152 :REM $C000  (END AT
   49900/$C2EC)
30 READ A$:IF A$="END"THEN 110
40 L=ASC(MID$(A$,2,1))
50 H=ASC(MID$(A$,1,1))
60 L=L-48:IF L>9 THEN L=L-7
70 H=H-48:IF H>9 THEN H=H-7
80 PRINT"[HOME,RIGHT12]"P;
90 IF H>15 OR L>15 THEN PRINT
   :PRINT"DATA ERROR IN LINE";
   1000+INT((P-49152)/8):STOP
100 B=H*16+L:POKE P,B:T=T+B:P=P+1
    :GOTO 30
110 IF T<>86200 THEN PRINT
    :PRINT"MISTAKE IN DATA --> CHECK
    DATA STATEMENTS":END
120 PRINT"DONE":END
1000 DATA 4C,1F,C0,00,00,00,00,00
1001 DATA 00,00,00,00,00,0D,00,21
1002 DATA C1,27,C1,2F,C1,3F,C1,4C
1003 DATA C1,EA,EA,EA,4C,54,C0,A2
1004 DATA 05,BD,19,C0,95,73,CA,10
1005 DATA F8,60,60,A0,03,B9,00,02
1006 DATA D9,04,C1,D0,F5,88,10,F5
1007 DATA A0,05,B9,A2,E3,99,73,00
1008 DATA 88,10,F7,A9,00,8D,18,D4
1009 DATA 4C,EF,C0,E6,7A,D0,02,E6
1010 DATA 7B,4C,79,00,A5,9D,F0,F3
1011 DATA A5,7A,C9,FF,D0,ED,A5,7B
1012 DATA C9,01,D0,E7,20,2B,C0,AD
1013 DATA 00,02,20,74,C0,90,DC,A0
1014 DATA 00,4C,A9,C1,C9,30,30,06
1015 DATA C9,3A,10,02,38,60,18,60
1016 DATA C8,B1,7A,C9,20,D0,03,C8
1017 DATA D0,F7,B1,7A,60,18,C8,B1
1018 DATA 7A,F0,37,C9,22,F0,F5,6D
1019 DATA 03,C0,8D,03,C0,AD,04,C0
1020 DATA 69,00,8D,04,C0,4C,8E,C0
1021 DATA 18,6D,05,C0,8D,05,C0,90
1022 DATA 03,EE,06,C0,EE,09,C0,4C
1023 DATA CE,C1,18,6D,08,C0,8D,08
1024 DATA C0,90,03,EE,07,C0,EE,0A
1025 DATA C0,60,0A,A8,B9,0F,C0,85
1026 DATA FB,B9,10,C0,85,FC,A0,00
1027 DATA A9,12,20,D2,FF,B1,FB,F0
1028 DATA 06,20,D2,FF,C8,D0,F6,20
1029 DATA BC,C2,20,E4,FF,F0,FB,A0
1030 DATA 18,B9,08,C1,20,D2,FF,88
1031 DATA 10,F7,68,68,A9,00,8D,00
1032 DATA 02,4C,74,A4,4B,49,4C,4C
1033 DATA 91,91,0D,20,20,20,20,20
1034 DATA 20,20,20,20,20,20,20,20
1035 DATA 20,20,20,20,20,20,20,91
1036 DATA 0D,51,55,4F,54,45,00,4B
1037 DATA 45,59,57,4F,52,44,00,23
1038 DATA 20,4F,46,20,43,48,41,52
1039 DATA 41,43,54,45,52,53,00,55
1040 DATA 4E,49,44,45,4E,54,49,46
1041 DATA 49,45,44,00,4E,4F,20,43
1042 DATA 48,45,43,4B,53,55,4D,00
1043 DATA C8,B1,7A,D0,FB,84,FD,C0
1044 DATA 09,10,03,4C,84,C1,88,88
1045 DATA 88,88,88,B1,7A,C9,27,D0
1046 DATA 13,A9,00,91,7A,C8,A2,00
1047 DATA B1,7A,9D,3C,03,C8,E8,E0
1048 DATA 04,D0,F5,60,A9,04,4C,CA
1049 DATA C0,A0,00,B9,00,02,99,40
1050 DATA 03,F0,F0,C8,D0,F5,A0,00
1051 DATA B9,40,03,F0,E6,99,00,02
1052 DATA C8,D0,F5,20,96,C1,4C,12
1053 DATA C2,A0,09,A9,00,99,03,C0
1054 DATA 8D,3C,03,88,10,F7,A9,80
1055 DATA 85,02,A0,00,20,58,C1,20
1056 DATA 89,C1,20,ED,C1,E6,7A,E6
1057 DATA 7B,20,7C,A5,A0,00,20,80
1058 DATA C0,F0,D0,24,02,F0,06,4C
1059 DATA A8,C0,4C,CE,C1,C9,22,D0
1060 DATA 06,20,8D,C0,4C,CE,C1,20
1061 DATA BA,C0,4C,CE,C1,A0,00,B9
1062 DATA 00,02,20,74,C0,C8,90,0A
1063 DATA 18,6D,07,C0,8D,07,C0,4C
1064 DATA EF,C1,88,A2,00,B9,00,02
1065 DATA 9D,00,02,F0,04,E8,C8,D0
1066 DATA F4,60,18,AD,09,C0,69,41
1067 DATA 8D,09,C0,38,AD,0A,C0,E9
1068 DATA 19,90,06,8D,0A,C0,4C,1C
1069 DATA C2,AD,0A,C0,69,41,8D,0A
```

```
1070 DATA CØ,AD,Ø3,CØ,6D,Ø5,CØ,48
1071 DATA AD,Ø4,CØ,6D,Ø6,CØ,8D,ØC
1072 DATA CØ,68,6D,Ø8,CØ,8D,ØB,CØ
1073 DATA AD,ØC,CØ,6D,Ø7,CØ,8D,ØC
1074 DATA CØ,38,E9,19,9Ø,Ø6,8D,ØC
1075 DATA CØ,4C,52,C2,AD,ØC,CØ,69
1076 DATA 41,8D,ØC,CØ,AD,ØB,CØ,E9
1077 DATA 19,9Ø,Ø6,8D,ØB,CØ,4C,67
1078 DATA C2,AD,ØB,CØ,69,41,8D,ØB
1079 DATA CØ,AØ,Ø1,AD,Ø9,CØ,CD,3C
1080 DATA Ø3,DØ,2Ø,C8,AD,ØA,CØ,CD
1081 DATA 3D,Ø3,DØ,17,C8,AD,ØB,CØ
1082 DATA CD,3E,Ø3,DØ,ØE,AD,ØC,CØ
1083 DATA CD,3F,Ø3,DØ,Ø6,2Ø,CC,C2
1084 DATA 4C,4B,CØ,98,48,68,4C,CA
1085 DATA CØ,A9,2Ø,8D,ØØ,D4,8D,Ø1
1086 DATA D4,A9,Ø9,8D,Ø5,D4,A9,ØF
1087 DATA 8D,18,D4,6Ø,2Ø,A9,C2,A9
1088 DATA 81,2Ø,DF,C2,A9,8Ø,2Ø,DF
1089 DATA C2,4C,D9,C2,2Ø,A9,C2,A9
1090 DATA 11,2Ø,DF,C2,A9,1Ø,2Ø,DF
1091 DATA C2,A9,ØØ,8D,Ø4,D4,6Ø,8D
1092 DATA Ø4,D4,A2,7Ø,AØ,ØØ,88,DØ
1093 DATA FD,CA,DØ,FA,6Ø,END
```

MAGAZINE ENTRY PROGRAM—128

```
5 TRAP 2ØØ
1Ø PRINT"[CLEAR]POKING -";
2Ø P=4864 :REM $13ØØ  (END AT
   5545/$15A9)
3Ø READ A$:IF A$="END"THEN 11Ø
8Ø PRINT"[HOME,RIGHT12]"P;
1ØØ B=DEC(A$):POKE P,B:T=T+B:P=P+1
   :GOTO 3Ø
11Ø IF T<>59311 THEN PRINT
   :PRINT"MISTAKE IN DATA --> CHECK
   DATA STATEMENTS":END
12Ø PRINT"DONE":END
2ØØ PRINT:PRINT"DATA ERROR IN LINE";
   1ØØØ+INT((P-4864)/8):END
1ØØØ DATA 4C,1E,13,4C,3A,13,ØØ,ØØ
1ØØ1 DATA 8E,ØØ,F7,ØØ,42,41,51,57
1ØØ2 DATA ØD,ØØ,ØD,43,Ø8,14,ØE,14
1ØØ3 DATA 16,14,26,14,33,14,A9,ØØ
1ØØ4 DATA 8D,ØØ,FF,AD,Ø4,Ø3,8D,12
1ØØ5 DATA 13,AD,Ø5,Ø3,8D,13,13,A2
1ØØ6 DATA 4A,AØ,13,8E,Ø4,Ø3,8C,Ø5
1ØØ7 DATA Ø3,6Ø,AD,12,13,8D,Ø4,Ø3
1ØØ8 DATA AD,13,13,8D,Ø5,Ø3,6Ø,6C
1ØØ9 DATA 12,13,A5,7F,DØ,F9,AD,ØØ
1Ø1Ø DATA Ø2,2Ø,5B,13,9Ø,F1,AØ,ØØ
1Ø11 DATA 4C,6F,14,C9,3Ø,3Ø,Ø6,C9
1Ø12 DATA 3A,1Ø,Ø2,38,6Ø,18,6Ø,C8
1Ø13 DATA B1,3D,C9,2Ø,DØ,Ø3,C8,DØ
1Ø14 DATA F7,B1,3D,6Ø,18,C8,B1,3D
1Ø15 DATA FØ,35,C9,22,FØ,F5,6D,Ø6
1Ø16 DATA 13,8D,Ø6,13,AD,Ø7,13,69
1Ø17 DATA ØØ,8D,Ø7,13,4C,75,13,18
1Ø18 DATA 6D,Ø8,13,8D,Ø8,13,9Ø,Ø3
1Ø19 DATA EE,Ø9,13,EE,ØC,13,6Ø,18
1Ø2Ø DATA 6D,ØB,13,8D,ØB,13,9Ø,Ø3
1Ø21 DATA EE,ØA,13,EE,ØD,13,6Ø,ØA
1Ø22 DATA A8,B9,14,13,85,FB,B9,15
1Ø23 DATA 13,85,FC,AØ,ØØ,8C,ØØ,FF
1Ø24 DATA A9,12,2Ø,D2,FF,B1,FB,FØ
1Ø25 DATA Ø6,2Ø,D2,FF,C8,DØ,F6,2Ø
1Ø26 DATA 79,15,2Ø,A3,15,2Ø,E4,FF
1Ø27 DATA FØ,FB,AØ,1B,B9,EF,13,2Ø
1Ø28 DATA D2,FF,88,1Ø,F7,68,68,A9
1Ø29 DATA ØØ,8D,ØØ,Ø2,4C,B7,4D,91
1Ø3Ø DATA 91,ØD,2Ø,2Ø,2Ø,2Ø,2Ø,2Ø
1Ø31 DATA 2Ø,2Ø,2Ø,2Ø,2Ø,2Ø,2Ø,2Ø
1Ø32 DATA 2Ø,2Ø,2Ø,2Ø,2Ø,2Ø,91,ØD
1Ø33 DATA 51,55,4F,54,45,ØØ,4B,45
1Ø34 DATA 59,57,4F,52,44,ØØ,23,2Ø
1Ø35 DATA 4F,46,2Ø,43,48,41,52,41
1Ø36 DATA 43,54,45,52,53,ØØ,55,4E
1Ø37 DATA 49,44,45,4E,54,49,46,49
1Ø38 DATA 45,44,ØØ,4E,4F,2Ø,43,48
1Ø39 DATA 45,43,4B,53,55,4D,ØØ,C8
1Ø4Ø DATA B1,3D,DØ,FB,CØ,Ø6,1Ø,Ø3
1Ø41 DATA 4C,69,14,88,88,88,88,88
1Ø42 DATA B1,3D,C9,27,DØ,13,A9,ØØ
1Ø43 DATA 91,3D,C8,A2,ØØ,B1,3D,9D
1Ø44 DATA ØØ,ØB,C8,E8,EØ,Ø4,DØ,F5
1Ø45 DATA 6Ø,4C,5C,15,4C,C5,14,AØ
1Ø46 DATA Ø9,A9,ØØ,99,Ø6,13,8D,ØØ
1Ø47 DATA ØB,88,1Ø,F7,A9,8Ø,85,FD
1Ø48 DATA AØ,ØØ,2Ø,3F,14,2Ø,AE,14
1Ø49 DATA 2Ø,ØD,43,84,FA,AØ,FF,2Ø
1Ø5Ø DATA 67,13,FØ,D8,24,FD,FØ,Ø6
1Ø51 DATA 2Ø,8F,13,4C,8F,14,C9,22
1Ø52 DATA DØ,Ø6,2Ø,74,13,4C,8F,14
1Ø53 DATA 2Ø,9F,13,4C,8F,14,AØ,ØØ
1Ø54 DATA B9,ØØ,Ø2,2Ø,5B,13,C8,9Ø
1Ø55 DATA ØA,18,6D,ØA,13,8D,ØA,13
1Ø56 DATA 4C,BØ,14,88,6Ø,18,AD,ØC
1Ø57 DATA 13,69,41,8D,ØC,13,38,AD
1Ø58 DATA ØD,13,E9,19,9Ø,Ø6,8D,ØD
1Ø59 DATA 13,4C,CF,14,AD,ØD,13,69
1Ø6Ø DATA 41,8D,ØD,13,AD,Ø6,13,6D
1Ø61 DATA Ø8,13,48,AD,Ø7,13,6D,Ø9
1Ø62 DATA 13,8D,ØF,13,68,6D,ØB,13
1Ø63 DATA 8D,ØE,13,AD,ØF,13,6D,ØA
1Ø64 DATA 13,8D,ØF,13,38,E9,19,9Ø
1Ø65 DATA Ø6,8D,ØF,13,4C,Ø5,15,AD
1Ø66 DATA ØF,13,69,41,8D,ØF,13,AD
1Ø67 DATA ØE,13,E9,19,9Ø,Ø6,8D,ØE
1Ø68 DATA 13,4C,1A,15,AD,ØE,13,69
1Ø69 DATA 41,8D,ØE,13,AØ,Ø1,AD,ØC
1Ø7Ø DATA 13,CD,ØØ,ØB,DØ,2Ø,C8,AD
1Ø71 DATA ØD,13,CD,Ø1,ØB,DØ,17,C8
1Ø72 DATA AD,ØE,13,CD,Ø2,ØB,DØ,ØE
1Ø73 DATA AD,ØF,13,CD,Ø3,ØB,DØ,Ø6
1Ø74 DATA 2Ø,89,15,A4,FA,6Ø,98,48
1Ø75 DATA 68,4C,AF,13,A9,Ø4,4C,AF
1Ø76 DATA 13,A9,ØØ,8D,ØØ,FF,A9,2Ø
1Ø77 DATA 8D,ØØ,D4,8D,Ø1,D4,A9,Ø9
1Ø78 DATA 8D,Ø5,D4,A9,ØF,8D,18,D4
1Ø79 DATA 6Ø,2Ø,61,15,A9,81,2Ø,9C
1Ø8Ø DATA 15,A9,8Ø,2Ø,9C,15,4C,96
1Ø81 DATA 15,2Ø,61,15,A9,11,2Ø,9C
1Ø82 DATA 15,A9,1Ø,2Ø,9C,15,A9,ØØ
1Ø83 DATA 8D,Ø4,D4,6Ø,8D,Ø4,D4,A2
1Ø84 DATA 7Ø,AØ,ØØ,88,DØ,FD,CA,DØ
1Ø85 DATA FA,6Ø,END
```

Although there are almost 1000 known Commodore user groups nationwide and around the world, this list includes only those that have been officially recognized by Commodore as Approved User Groups. If your group would like to apply for Approved status, contact Pete Baczor, User Group Coordinator, at Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

Commodore user groups provide invaluable assistance to Commodore computerists. If you are looking for people who share your computing interests, or if you need help getting started with your computer, contact the group near you.

Part 2—*Cont'd from July*

MICHIGAN

Ann Arbor
Commodore Users' Group of the U of Michigan
School of Public Health, MI 48109
PET VIC 64 128

Bay City
Commodore Connection Club
400 - 18th St., MI 48708

Brooklyn
Columbia Commodore Computer Club
133 Ernest, MI 49230
64 128 Amiga

Clio
Northern Genesee Commodore Users' Group
P.O. Box 250, MI 48420

Coloma
Access Unlimited
6777 Bayview Dr., MI 49038
VIC 64 128 Amiga

Dollar Bay
Copper County Computer Users' Group
P.O. Box 196, MI 49922

Dryden
ACO
4401 Pinegrove Dr., MI 48428

East Lansing
Lansing Area Commodore Club
P.O. Box 1065, MI 48823

Gaylord
Northern Michigan Commodore Club
P.O. Box 3066, MI 49735
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Holland
Holland Area Commodore Users' Group
1576 Elmer, MI 49423
PET VIC 64 128 Amiga PC

Hudsonville
West Michaigan Commodore Users' Group
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Jackson
Jackson Commoodre Computer Club
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COMP
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VIC 64 128

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Traverse Area Commodore Club
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64 128

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Commodore Users Therapy Group
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64 128

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Sewell
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Upper Montclair
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Los Alamos Commcdore Users' Group
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Taos Area Commodore Users' Group
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Folklife Terminal Club
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PET VIC 64 128 Amiga PC

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Brooklyn Commodore Users' Group
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Conajohand
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100 Montgomery St., NY 13317

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Users' Group of Dentists
119 Franklin Ave., NY 11010

Glen Cove
Landing Users' Group
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Queens Commodore Users' Group
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37 Silver Ln., NY 11756

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New York
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64

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Indiana Commodore Users' Group
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Jersey Shore
Central Pennsylvania Users' Group For Commodore
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64 128 Amiga PC

Lemoyne
Capital City Comics
900 Market St., PA 17043

Lemoyne
Capitol Area Commodore Club
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VIC 64 128

New Kensington
AK-64 Users' Group
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Parksburg
Lighthouse Users' Group
103 Peacemaker Dr., PA 19365

Philadelphia
SUB-64
P.O. Box 54208, PA 19105
VIC 64 128 Amiga

Pittsburgh
Bettis Commodore Users' Group 592 Arbor Ln., PA 15236
64 128

Sayre
I.R. Users' Group
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PET VIC 64 128 Amiga PC

Uniontown
Uniontown Commodore Group
P.O. Box 1500, PA 15401

West Wyomising
Commodore Users' Group of Berks
2455 McKinleny Ave., PA 19609

West Chester
Computer Users' of Fugett & Friends
Fugett Middle School, 500 Ellis Ln., PA 19380
PET VIC 64 128

West Chester
Main Line Commodore Users' Group
1046 General Allen Lane, PA 19382
PET VIC 64 128 Amiga

Williamsport
West Branch Commodore Users' Group
P.O. Box 995, PA 17703

York
White Rose Commodore Users' Group
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64 128 Amiga PC

RHODE ISLAND

Newport
Newport Computer Club
P.O. Box 1439, RI 02840-0997
64 128

SOUTH CAROLINA

Columbia
Commodore Computer Club of Columbia
318 Quincannon Drive, SC 29210
VIC 64 128

Rock Hill
Rock Hill Commodore Users' Group
417 S. Spruce St., SC 29730
VIC 64 128

Spartanburg
Spartanburg Commodore Users' Group
P.O. Box 319, SC 29301
VIC 64 128 Amiga PC

SOUTH DAKOTA

Rapid City
Port-64
1705 Cruz Dr., SD 57702

TENNESSEE

Big Sandy
Club West
Route 2, Box 128-B, TN 38221
64 128

Estill Springs
Commodore Users' Club
P.O. Box 96, TN 37330
64 128

Germantown
Memphis Amiga Group
P.O. Box 381462, TN 38138-1462

Jackson
Old Hickory Commodore Users' Group
542 Lambuth Blvd., TN 38301
64 128

Memphis
Commodore Asociation of the Mid-South
3318 Keystone Ave., TN 38128
VIC 64 128

Memphis
Raleigh-Bartlett Hackers
Commodore Users' Group
3457 Gatewood Dr., TN 38134
64 128

Memphis
Memphis Commodore Users' Group
P.O. Box 34095, TN 38134-0095

Millington
Millington Commodore Users' Group
7770 West Navy Cr., TN 38053
VIC 64 128

Nashville
Nashville Commodore Users' Group
P.O. Box 121282, TN 38305

Springfield
Springfield Commodore Users' Group
P.O. Box 62, TN 37172
64 128

TEXAS

Amarillo Tri State Commodore Users' Group
P.O. Box 8971, TX 79114-8971

Austin
Central Texas Amiga Computer Society
1704 Taylor Gaines St., TX 78741
Amiga

Bay City
Bay City Commodore Users' Group
2211 Gontier Drive, TX 77414
PET VIC 64 128 Amiga

Bedford
Mid-Cities Commodore Club
P.O. Box 1578, TX 76021
64 128 Amiga

El Paso
El Paso Commodore Users' Group
P.O. Box 370934, TX 79937
PET VIC 64 128 Amiga PC

Gainesville
Cooke County Commodore Users' Group
1004 S. Howeth Street, TX 76240-5904

Longview
Longview Users' Group
P.O. Box 9284, TX 75608

Lubbock
Commodore Users' of Texas
Rt. 12, Box 64, TX 79424
PET VIC 64 128 Amiga PC

Pampa
Top of Texas Commodore Users' Group
P.O. Box 2851, TX 79066-2851
PET VIC 64 128 Amiga PC

Sherman
Sherman Commodore Users' Group
800 Hwy. 1417, Apt. 211 Bldg 2, TX 75090
64 128

Texarkana
Ark-La-Tex Commodore Users Exchange
P.O. Box 6473, TX 75505
PET VIC 64 128 Amiga PC

Waco
Heart of Texas Home Users' Group
332-D Richland Drive, TX 76710

West
West Commodore Users' Group
Route 1, Box 97-B, TX 76691
64 128

UTAH

Logan
Cache Valley Computer Club
467 N. 200 W, UT 84321

Salem
PAC 64
P.O. Box 525, UT 84653
64 128

VERMONT

South Burlington
Champlain Valley Commodore Users' Group
6 Mayfair Street, VT 05401
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VIRGINIA

Alexandria
Arlington VICtims
5521 Harvey Lane, VA 22312

Blacksburg
New River Valley Commodore Users' Group
506 Cranwell Cir., VA 24060-5505
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Bristol
TriNet
P.O. Box 503, VA 24203

Charlottesville
Piedmont Commodore Group
P.O. Box 5412, VA 22905

Dale City
Dale City Commodore Users' Group
P.O. Box 2265, VA 22193-0265
PET VIC 64 128 Amiga

Hampton
Peninsula Commodore Users' Group
P.O. Box L, VA 23666
PET VIC 64 128 Amiga PC

Haysi
Black Diamond Commodore Society
Rt 2, Box 628, VA 24256

Herndon
AMC Commodore Club
2903 Rock Manor, VA 22071
64 128

Lebanon
Commodore Hilltop Users' Group
Box 464, VA 24266
PET VIC 64 128 Amiga PC

Richlands
Bits & Bytes
P.O. Box 625, VA 24641

Richmond
T.R.A.C.E.
2316 Lafayette Avenue, VA 23228

Richmond
C.U.R.V.E.
P.O. Box 28284, VA 23228

Virginia Beach
Tidewater Commodore Users' Group
P.O. Box 61814, VA 23462
VIC 64 128 Amiga

Bellingham
Commodore Bellingham Users' Group
P.O. Box 2756, VA 98227
VIC 64 128

Burley
Commodore Users' of Puget Sound
P.O. Box 86, VA 98322

WASHINGTON

Olympia
Olympia Commodore Users' Group
1822 Eastwood Place, WA 98501
64 128 Amiga PC

Port Angeles
Olympic Peninsula Users' Group
P.O. Box 1894, WA 98362
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Richland
Tri-City Commodore Club
P.O. Box 1064, WA 99352

Seattle
University of Washington Commodore Users' Group
P.O. Box 75029, WA 98124
VIC 64 128

Spanaway
Pierce County Commodore Computer Club
19404 Twinkle Dr., E., WA 98387
64 128

Spokane
Spokane Commodore Users' Group
P.O. Box 1753, WA 99210-0000
128 Amiga PC

Tacoma
World Wide Users' Group
9524 S. Ash, WA 98444

Walla Walla
Blue Mountain Commodore Users' Group
550 S. 2nd Avenue, WA 99362-3149

Yakima
Yakima Area Commodore Club
P.O. Box 10937, WA 98909
VIC 64 128 Amiga

WEST VIRGINIA

Bluefield
BUG 20/64
P.O. Box 1190, WV 24740
VIC 64 128

Montgomery
WVIT Personal Computer Club
West Virginia Tech, Box 229 Maclin Hall, WV 25136
VIC 64 128

Wheeling
C.H.U.B. - Commodore Home Users' Group
81 Lynwood Avenue, WV 26003

WISCONSIN

Chippewa Falls
Chippewa Valley Commodore Users' Group
309 W. Garden, WI 54729
VIC 64 128 Amiga

Greendale
M.A.C.E.
P.O. Box 183, WI 53129
64 128

Janesville
Rock County Commodore Users' Group
P.O. Box 1858, WI 53545
VIC 64 128

Phillips
Price County Commodore Users' Group
Route 2, Box 532, WI 54555
PET VIC 64 128 Amiga PC

Platteville
Tri-State Commodore Users' Group
555 Irene St., WI 53818

Sheboygan
Lakeshore Commodore Club
Route 1, WI 53081
PET VIC 64 128 Amiga PC

Continued from pg. 46

characters, then puts up a few paragraphs detailing the initial situation. Each player checks the message board and leaves a message telling what his character will do. You can send E-mail to other players first if you want to form a plan. Then the GM determines the results of everyone's actions and posts the next message. Games like this often go on for months. E-mail games are similar, but the messages are sent back and forth via E-mail instead of being posted on a board in the Guild.

Conference games are conducted live in The Dungeon, which is the Guild's own conference area, or in a private room in People Connection. Game play follows the same pattern, but the action is much more intense because it's so immediate. Players can communicate secretly via OLMs (on-line messages that are seen only by the person to whom they're addressed), and the GM can use OLMs to limit certain information to one or more players.

The Guild also offers sanctioned adventures that are run by experienced GMs. For these you must use a Guild-approved character whose abilities and traits are determined by the GM. Players who are successful in these games get to see their characters listed in the Guild Roster, which is like the Hall of Fame for on-line adventurers. Like message and E-mail games, conference adventures may be on-going campaigns, or the quest might be finished in one or two sessions lasting maybe an hour or two each.

You can find announcements about upcoming games in the Town Crier board. Two other message boards serve as free-form role-playing games in which you assume the role of any character you choose—a Paladin you created in *Ultima III*, an elf from *Rings of Zilfin*—and interact with other players by responding to their messages or inventing a situation to which they can react. One board is devoted to science fiction, the other to fantasy (similar free-form rooms often materialize in People Connection too; The Red Dragon Inn is frequently packed with trolls, wizards, and even an occasional visitor from a distant star). Phantasy Guild is located in Game World, formerly called the Game Room.

So if you're still grumbling about the overdue appearance of *Habitat*, examine Q-Link closely next time you sign on and you'll find plenty of opportunities for adventure. Be sure to drop me a line (and some clues!) care of JB Chalmer.

Tips of the Month

For those who haven't joined QuantumLink and therefore don't have access to the clues in Q-Link's various message boards, here are a few from the latest issue of QuestBusters, the Adventurers' Journal (to decode them, count back two letters: c becomes a, a becomes y, and so on).

Wrath of Denethenor: Talk to the bartender before chatting with any of the patrons in a bar. Speaking to them first might spark a bar-room brawl that will cause you to miss valuable clues. After crossing Fgcvj Ogcfqy and exiting through the Interdimensional Door, be careful not to kill the Engtke when you slay the monsters there. This is Lcpck, who will give you the jgomqem you can take back to Nqtf Okttkj—who will increase your intelligence. When you're set to kill Denethenor, make certain you are standing next to him before speaking the unspoken spell—WTGPFWKTGUGZ.

Be sure to visit the Jgtokv (south of Dcemyqqfu) and NqtfUqntckp. Pay close attention to remarks with unusual words that start with a capital letter. When used with the correct object, the magic spell to open doors lets you both in and out of a locked door. Traps in Firetrench are marked with two dots (like ..), so watch out for them. You can buy extra hit points from the Rtkguv in Ftz Iwnej.

To earn extra money and experience points quickly in *Rings of Zilfin*, go to the gate of Islanda and move across the top (just below the gate) until you meet some monsters. You'll battle with ghouls and evil spirits here, who usually carry 300 gold pieces. It helps to have a Priest in your party. After defeating them, go north through the gate and get healed up at the town of Athe, then save the game and repeat as often as you like.

Hollywood Hijinx has a couple of safes with combination locks. The clues to the one in the hallway are in plain view. Just look at the hkpigtu of the uvcvwgvgu. The other safe's combination is written on the safe! Read the plaque: The combination is based on the hktuv ngvvgt and number of ngvvgtu in each pcog. If you're still having trouble getting into the house, read Buddy's rqgo and use the directions on Dwem.

CARVER GANG Still at Large

Continued from pg. 75

game components. If we had used a raster to regulate the power snap indicator, the operation would have been jerky, non-linear and a visual mess. There are 16 different timers present in *Leader Board*.

Jermaine: Was it difficult to simulate the movement and trajectory of a golf ball?

B. Carver: Actually, moving the ball around the grid was one of the easier segments of the game to program. *Leader Board* uses an artificial velocity system called auto move which derives its data from a group of timers. Auto move converts velocity, acceleration, gravity and wind into real world measurements of so many inches per second. This information is then converted into three-dimensional X, Y and Z statistics. The X reading refers to the horizontal aspect of the grid, Y deals with height or vertical coordinates, and Z has to do with the depth of the picture.

R. Carver: Trajectory is determined by two tables of values. One is called Y-ratio and the other Z-ratio. These tables determine how far up and out into the distance the ball will travel on the grid. We like to think of this as the rise-over-ground factor of the game. This information is another factor used in the generation of the X, Y and Z values.

There is another routine in the loop called trans which actually moves the image of the ball whenever the interrupt system changes the coordinates of the ball within the program. Once the ball approaches the ground, another routine in the loop called ball monitor comes into play. Ball monitor takes the values of X, Y and Z and begins subtracting numbers to account for wind, gravity and collision with the ground. When all of the velocity values are finally reduced to zero, the ball is at rest.

Jermaine: Any other unique aspects of *Leader Board?*

B. Carver: As we were finishing the mechanics of the program, Roger and I had to face reality. We were practically out of memory and had to make some concrete decisions. Originally, we wanted to give the user the option of being able to use any club whenever he pleased. This was a reasonable idea, but it created several major problems. To keep things simple, we decided to make it mandatory that the golfer must putt whenever he is within 64 feet of the hole. We also installed a rule that says once you arrive on the green, you must stay on the green.

The hole itself has some interesting characteristics. It has a diameter of one foot when you tee off or drive the ball in the direction of the green from a great distance away. When you're putting, the hole shrinks in size significantly. Roger and I set things up this way so the golfer always has a chance of getting a hole-in-one or sinking a difficult shot from outside the green.

One of the most challenging aspects of the game was making the contours of the green. Adding slope to the green was no big deal, but visually displaying the contour was tough. The problem was the fact that we had to keep four colors present in the drawing area for sketching polygons and filling them. By doing things this way, we weren't able to add a shade of a color to the palette for generating the contour effect. Roger and I couldn't graphically reproduce contour on the screen, so we compromised. The green appears to be flat when you see it on the screen, but the indicator attached to the flag shows you otherwise.

R. Carver: The splash sound in *Leader Board* is an unusual effect. Believe it or not, there is only one splash sound used in the game. A routine decides how far away the ball is and reduces the volume of the splash accordingly. I think there are four volume settings for the splash sound in the program.

If you're wondering about the courses themselves, they aren't patterned after any existing holes. I should know—I dreamed them up myself. One day I sat down with a huge pile of graph paper and began designing 144 holes. This task didn't take a long time, but I was really burned out when it was completed. Our office people examined the completed hole designs and put them into courses, according to how difficult they looked.

We had wanted to make the *Leader Board* courses progressively harder, but the third course is the toughest. That's what happens when you set up courses visually instead of playing them first.

Jermaine: What can you tell us about the sequels to *Leader Board?*

B. Carver: Well, when we started *Leader Board*, we tried to install trees, roughs and traps into the design of the game. Unfortunately, our first effort was a failure. We were also working under a deadline situation. If we promise to deliver a game by a certain date and miss it, our customers and distributors get very upset. To keep peace with the world, Roger and I decided to forget about trees and things for a while and concentrate on making *Leader Board* the best game possible using water hazards. The *Leader Board Tournament Disk #1* contains four new 18 hole courses. Once we licked the problem of adding trees, traps and roughs, we put together the *Executive Tournament Disk #1*. Both need the original *Leader Board* to work.

Jermaine: Is it true that you almost didn't make your bowling game, *Tenth Frame?*

B. Carver: Yes, it certainly is. The comments on our warranty cards told us that there was a market for a Commodore 64 bowling program, so I brought the gang together and we examined the options. All of us agreed that the software should be more simulation than game. As I was putting together the program mechanics in my mind, everything worked out perfectly. Roger started converting a video tape of a bowler into computer graphics while I went off and worked with Steve Witzel on Multibotic projects.

When Roger and I returned to creating the game, I had apparently missed something in my original thinking. I couldn't come up with a fast enough method of moving the pins once the ball had struck them. Spinning the pins was also a stumbling block. I worked three weeks trying to solve this problem, but everything I tried could not be accomplished before the raster interrupt came around again.

Jermaine: And how did you solve this problem?

B. Carver: I had to make some simplifying assumptions which made the pin action of *Tenth Frame* very realistic. First of all, instead of working with pins, the computer believes it is manipulating billiard balls or spheres. Secondly, we couldn't let the pins move around vertically. As far as the computer is concerned, they are flying around in an X and Z coordinate system. The Y vertical component is present throughout the game, but it's not used significantly in the calculations.

Now that we have pins moving, another rule comes into the scheme of things. A pin can only hit stationary pins. Moving objects can not strike each other on the screen. These rules made it feasible to do the game, but I was still plagued with the problem of updating graphics before the raster could complete a cycle. I couldn't move the ball and manipulate pin action using the velocity system from *Leader Board*. My only alternative was to do everything with mathematics. Equations of motion

are calculated for each pin and for the ball during the collision sequence based on ball speed, amount of hook, angle of incidence and number of pins on the alley. The entire sequence is calculated mathematically before the ball actually gets to the pin area. Then the equations of motion are used to recreate the action graphically on the screen. A split such as the five ten, for example, will be made if the equations for the ball, the five pin and the ten pin cause them to collide.

Jermaine: Did you face any other obstacles creating *Tenth Frame?*

R. Carver: Well, we did encounter some interesting problems when we tried to control the action of the ball in *Tenth Frame*—Bruce and I ran out of sprites. There are eight sprites available in the program. The bowler requires six sprites, the ball uses one, and the marker needs an additional sprite. These sprite requirements add up to eight alright, but you still need two more sprites for the pins at the end of the alley. Since you're on the same horizontal line, you can't perform some sort of raster trick to make the graphics work correctly.

What we had to do was horizontally split the screen in two. When you throw a ball, it remains the same sprite on both sides of the line. The six sprites that might have been the bowler at the bottom of the screen, under raster interrupt, are the same sprites being used for the pins and other things up above. Two sprites are needed for the pins, the pin setter requires a sprite, and the rake uses another sprite.

Another story also comes to mind. We videotaped a strike, translated it into computer graphics, and used that sequence as a demo for the program. This graphic display was shown at several conventions. At one time in the evolution of the game, Bruce had thought that it might be possible to videotape and digitize pin action shots and use them in the program. On the surface, this idea sounded great until you begin counting the thousands of possible pin combinations. If we had used this approach, *Tenth Frame* could have become the first game to fill several hard disks.

B. Carver: Roger and I lined up a pro bowler to use as the model for our bowler in the game. That same guy appears on the *Tenth Frame* package. We examined his approach, but it wasn't quite standard enough. I wanted to see a generic approach, so I convinced Roger to go through the motion of bowling. His approach was exactly what we were looking for. Once again, we used 32 frames to display the sequence of the bowler throwing the ball.

As you release the ball, eight equations tell the computer how the ball will enter the zone, the pins it will strike, the pins that will theoretically collide with other pins, and so on. The zone exists 12 inches in front of the pins and continues to the pit behind them. Before the ball is half way down the alley, these equations have determined the results of the throw, and the system can graphically display what will take place whenever that image is requested. To show you how complex this pin action really is, when the ball hits a pin, it will take off at one of about 64 different angles.

I bowl around 150, and usually score in the 180's when I play *Tenth Frame* in the amateur level. Roger is a better bowler. He occasionally bowls above 200, and his high score for *Tenth Frame* is 236 in the amateur level of play.

Jermaine: Any closing comments?

B. Carver: One thing we didn't discuss was the security keys that we use to protect *Leader Board* and *Tenth Frame*. We created them to slow down the pirate who plans to mass produce our games. A consumer recently wrote us complaining that he didn't think it was fair to charge him $10 for a replacement security key. After all, it couldn't cost more than a dollar to manufacture. He's absolutely right. It costs us about 60¢. If this individual really lost his key, I'm sorry, but he has no idea how many requests we get for replacement instructions and keys. The number is staggering. If a consumer does purchase an Access product that is missing a component, we tell him to return the rest of the package to us, and we will replace it. I don't hear from 95% of these individuals after we give them these instructions.

R. Carver: We may not be very close as brothers in terms of socializing away from work, but our personalities and the logical way we look at things allows us to work well as a team. The real secret to Access's success is team spirit. Even though Bruce is president, there are times when he boxes product like the regular employees. I hope we can continue to develop superior software for our followers.

As you read this interview, Bruce and Roger Carver are still at large. Rumors continue to circulate that they are working on a new sports simulation, something totally new that has yet to be seen. Whatever the case, I understand that they have decided to go straight—straight into the software history books, that is.

Monster-Whompin'...

Continued from pg. 71

But I Don't Want to Slay the Evil Wizard!

You don't have to cast magic spells or slay Evil Wizards in all role-playing games, for the latest trend features science fiction and other themes. *AutoDuel* is a futuristic scenario in which you drive heavily armed, animated cars into combat on the highway or in an arena. The goal is to capture a major crime boss.

Roadwar 2000 turns a similar theme into a combination quest-war game as you look for eight scientists while directing the actions of up to 15 cars in tactical combat. Yet another game, *Wastelands*, is also set in a future reminiscent of a Road Warrior movie.

The phenomenal IBM game, *Starflight*, should be ready for the 64 by December or January. It takes your crew of six to 270 star systems and 800 planets to prevent your planet's star from exploding. *Deep Space*, a British import, is also science fiction oriented. You can explore the deep blue sea as well as deep space.

The maze in *Titanic: The Recovery Mission* recreates the eerie halls and rooms of that sunken ship as you search for treasure and strive to salvage it. Or you can go scuba diving in *Return to Atlantis* to look for the mythical city. And if you feel really creative, you can always write your own role-playing game with *Adventure Construction Set*.

Commodore 64 and Amiga
Adventure Construction Set (Electronic Arts)
AutoDuel (Origin Systems/Electronic Arts)
The Bard's Tale (Electronic Arts)
Destiny Knight (Electronic Arts)
Phantasie I and II (Strategic Simulations)
Roadwar 2000 (Strategic Simulation)
Temple of Apshai (Epyx)
Ultima III (Origin Systems/Electronic Arts)
Wizard's Crown (Strategic Simulations)
Wizardry (Sir-Tech)
Moebius (Origin Systems/Electronic Arts)
Realms of Darkness (Strategic Simulations)
Rings of Zilfin (Strategic Simulations)
Starflight (Electronic Arts)
Ultima I (Origin Systems/Electronic Arts)
Ultima II (Origin Systems/Electronic Arts)
Ultima IV (Origin Systems/Electronic Arts)
Wastelands (Electronic Arts)
Wrath of Denethenor (Sierra On-Line)
Xyphus (PolareWare)

Commodore 64 Only
Might and Magic (Newworld/Activision)

Amiga Only
Deep Space (Psygnosis)
Return to Atlantis (Electronic Arts)

Keep It Safe . . .

Continued from pg. 79

color monitor. Then came the printer (forgetting, of course, ribbons and paper for it too).

Okay, so now you've gotten all your peripherals. They don't require a lot of maintenance, but the little they need is important. Disk drives and printers require the most care. Drives need to stay clean and cool. One time a friend was fuming because a program I had advised him to buy failed. It turned out that the program wasn't the problem—instead, his disk drive was on the verge of a heatstroke. I had mentioned time and time again that he should get a fan for his disk drive, but he always put it off. Drives (especially the older 1541's) can overheat and go into terminal shock when the heat rises inside their casing.

Fortunately, the preventive medicine for the ailment is cheap— a small fan located to blow across the unit. While you can buy special units which fit on top of the drives, I've found the tiny personal fans which most of the drug stores stock in the summer are perfect for the task, and cheap too—the two I use cost only $6.95 each. I positioned each to blow across the drive's vent openings to cool the circuit board but not force air (or dust) toward the unit's recording head.

Cleaning Your Disk Drive

After you've brought your drive's temperature down to a healthy level, you need to periodically clean it. You can buy special cleaning disks, but I prefer to manually clean my drives with a cotton swab and head cleaner. Regular personal swabs will work, but those with longer sticks make it easier to get to the area in the drive you need to reach. You can get the long swabs at any Radio Shack store in a package of 100 for under $2. Any good cleaner for a tape recorder head will work, but if you prefer you can buy cleaner labeled specifically for disk drives. Two ounces of cleaner should set you back under $3 and is enough to last a long time.

Getting to the drive's read/write head isn't difficult, but requires you take the unit apart. Opening the case will void your warranty, but since you shouldn't need to clean the head for at least a year (unless you really grind out the disk), by the time you need to open the case, the warranty period will have expired anyway.

To open the drive, first unplug it from both the electrical outlet and the computer. Move it to a clean surface and lay it on its back. With a small screwdriver, remove the screws at each corner. **[Warning: This voids your warranty.]** Next, flip the unit top side up again and lift up on the top of the case. Lay the cover to one side. What you'll see now is several wires, some metal parts, and a cage protecting the circuit board. Be careful not to disturb any of the chips, wires or transistors. On one side of the cage you will see two small metal screws.

To remove the cage, you need to remove these screws and lift the cage off. Just beneath the edge of the circuit board is the head you want to clean (on a 1571 drive there will be two—one on top and one on the bottom). With your finger, gently lift up on the arm holding the pressure plate; beneath it you will see something which looks like a white ceramic eye. That is the read/write head. Dip your swab in some head cleaner and scrub it. Now put everything back together and that chore is done for another year.

If you prefer, you can use a commercial cleaning disk, but I have three objections to them. First, they cost around $30, while swabs and cleaner set me back less than $6 (remember how cheap I am). Second, the disk cleaner can, with repeated use, be abrasive to the drive's head since they scrub at a very high speed. And third, because the cleaning is always done inside the drive where I can't see, I've never been sure the cleaning disk and the heads ever came into contact.

Printer Care

A printer has more moving parts than any other peripheral in your system so it requires more attention. The tiny pins which strike the ribbon constantly move in and out during printing. Like the engine in your car, a good lubricant is needed to keep these little pistons from overheating. This lubricant is supplied by the ink in the ribbon. When a ribbon begins to dry out, not only does your copy look pale, but the chance of the head overheating and failing increases. When a ribbon becomes old and worn, tiny pieces of fabric may tear loose as the printing pins strike it. These fragments, combined with paper dust, can clog and destroy a head.

Insurance coverage for your system is a necessity too often forgotten until it is too late. Your homeowner's policy may cover it, but the time to ask is before you need to submit a claim.

To keep your printer working properly, replace the ribbon often, to protect not only your eyesight, but your printer's head as well. Never print onto the platen without paper in place. The paper and ribbon serve as shock absorbers for the pins and the platen. Without the two, the pins and platen quickly wear each other down.

Keeping all your units clean is important to insure proper, safe use. A gentle vacuuming, instead of dusting, of all the units not only makes them look better, but extends their lives. The vacuum removes the dust, hairs and small pieces of papers before they can find their way between moving parts where they can do damage. If you need to remove a stain or smudge, dampen (no drips allowed) a soft cloth with a mild liquid detergent (or just tap water) and rub. Don't use harsh detergents since they can remove more than dirt.

Quality at a Reduced Cost

A computer stand should be sturdy, at a comfortable height, and have usable space around it. There should be plenty of room for your feet below and designed so no wires hang down where they can be accidentally tugged when moving your chair or crossing your feet. This table can be as simple as a sheet of plywood supported by two filing cabinets or as exotic as inlaid mahogany. The important fact to remember is keep the distance from floor to table comfortable for typing and room around the computer for a copy stand, your mouse, manuals, and so on.

Next you need a stand for your monitor. For two months I suffered from a sore neck and didn't know why. I finally realized that my pain-in-the-neck was my monitor—it was too low. So I built a platform to bring the monitor up to eye level and the pain disappeared. While I was at it, I included a case to hold two drives and attached a fan on the side to cool both. In the end the pain forced me to organize my system and save working space. The cost, including a fan, paint and plywood

was $12.

To construct a one-drive unit, you'll need six pieces of plywood, a handful of nails, and some paint. If you wish, you can increase the area above the disk and use it for a printer stand. The result is a compact, sturdy self-cooled work area which will make any flat surface a computer station.

Saving More Money

Speaking of saving money, do you need a mouse pad for your mouse? I thought I did until I priced them. Then I noticed that a typewriter cushion was made of the same material, close to the same size, and cost only $1.75. My mouse hasn't noticed the difference yet.

Another item I wanted but refused to buy was a flexible copy stand. I use my computer for word processing 90% of the time and work with my notes or some document sitting next to the monitor at all times. If you copy a lot of program listings from magazines, you'll be delighted with the aid such a stand supplies. A copy stand makes computing easier and frees countertop space for other things, but the one at the office supply store had a $50 price tag hanging on it. Well, being the cheap guy that I am, I offered the store owner half that price for the unit. He looked at me like I was crazy. I told him I could build my own for one-fourth the price (that didn't seem to impress him).

All I needed was a swing-arm lamp. I got it from a discount drug store for $9. Next I bought a clipboard ($1.89) and a four-inch bolt with one nut (35¢). I removed the reflector and wiring from the lamp and stored them away for some future project. Next I drilled a quarter-inch hole four inches from the top of the clipboard and in the center. I put the bolt through the hole and tightened the nut on the reverse side. To finish, I bent the bolt about 15 degrees and inserted it into the groove where the lamp's reflector had been attached. Presto—I had a personal copy stand and a savings of $38.

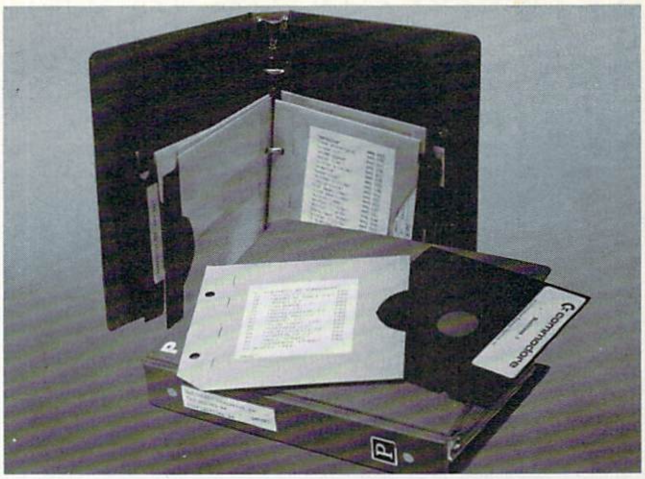
Disk Storage

I've always prided myself on being well organized. That's one of the things that attracted me to computers—disks are great organizers. But I quickly learned that keeping my disk collection manageable required more than plastic boxes. The solution I adopted uses 7 by 9-inch ring notebooks which cost around $3 each and will hold 20 or so disks each. To utilize the notebooks for disk storage, I make 5-1/4 by 5-1/4 inch envelopes open at one end. You can use mailing envelopes, but I usually make mine out of heavy paper and tape.

Next I punch holes in the closed end so they can be clipped in the notebook. A row of staples parallel to the inside edge and one inch from the holes forces the edge of the disk to stick out so they can be removed easily. Listing the contents of each disk is simple— I just load the directory of each (LOAD"$",8") and then dump the information to my printer (OPEN1,4:CMD1:LIST). Then I trim the listing and tape it on the face of the envelope.

I organize and separate the disk with notebook dividers. Rather than buy dividers, I get old page negatives from the newspaper office where I work. These are newsprint-size pieces of photographic film that the newspaper office just throws away. Chances are a newspaper office in your area throws them away as well and would be happy to share them with you.

Anyway, the film is tough—perfect for dividers. I cut them to size with scissors (four at a time) and presto, I've got free dividers. Each time I begin a new disk, I stick a label on a divider,



store the disk in an envelope, and put them in a notebook which corresponds to the disk's contents: graphics, word processing, GEOS, data base, telecommunications, spreadsheet, games, and so on. The notebooks store easily on the shelves around my systems, and the spine shows what each volume contains. To find the disk I want, I simply reach for the proper notebook, find the divider listing the subject I need, then search the directory listing like I would the table of contents in a book.

My computer systems, like my children, continue to grow. But hopefully it will be a long time before they outgrow their room. If I supply a clean, cool environment for my computer systems, we should grow old together. We have a pact—I take care of them and they take care of me. Seems fair to me. C

64 USERS ONLY/AUTORUN

Continued from pg. 98

```
      :PRINT UL$'EQHL
1490 PRINT TAB(11)"PRESS F1 FOR MENU"
      :RETURN'DEDN
1500 REM MESSAGE ROUTINE'BOKC
1510 :'ABHY
1520 IF Z<>1 THEN 1530'EGID
1525 C$="IS "+R$+F$+O$+"
      IN"+E$+E$+"(B)ASIC OR (M)ACHINE
      LANGUAGE? "'IMTW
1530 IF Z=2 THEN C$="ENTER NEW DEVICE
      NUMBER (8-11): "'EESM
1540 IF Z=5 THEN C$="ENTER START
      ADDRESS"+E$+E$+"OF "+R$+F$+O$+"
      : "'LODS
1550 IF Z=16 THEN C$="ENTER FILE
      NAME"+E$+E$+"OF PROGRAM TO
      AUTORUN: "'HJDT
1560 IF Z=17 THEN C$="ENTER FILE NAME
      OF"+E$+E$+"THE AUTORUN BOOT
      : "'HJLU
1570 IF Z=255 THEN C$="ENTER DISK
      COMMAND"+E$+E$+">"'HKYQ
1580 RETURN'BAQG
1590 L=LEN(S$):FOR T=1 TO L'FJGM
1600 POKE M+T,ASC(MID$(S$,T,1))'ENWE
1610 NEXT:RETURN'CBXB
1620 PRINT"ERROR IN DATA":END'CBQF
1630 FOR T=1 TO D:PRINT:NEXT
      :RETURN'GGVG
```

END

Tips & Tricks

Continued from pg. 60

Handy Notes: Does your monitor or other equipment sit on a raised shelf in front of you? If you put a piece of masking tape on the front edge of that shelf, you can use it as a place to record pokes, SYS numbers and other frequently-used but hard to remember information. It's difficult to find a more convenient location for this all important data.
Michele Pudik
Aliquippa, Pennsylvania

Nice Marker: An exceptionally good highlighting marker to have in your computer room is the Stabilo Boss 2™, available at most office supply stores. It's Stabilo's refillable model, available in several different colors (my favorites are yellow, orange and green). The Boss 2's shape keeps it from rolling around on the desk, and its chisel tip is exactly the right size for highlighting computer printouts or the listings found in magazines.
Shannon Gimbert
Charlottesville, Virginia

SAVE "YOUR MARRIAGE",8: I share my computer desk with my wife. On one half is my Commodore 64 and on the other is her writing and sewing area. This way, my wife and I can be together doing things we like.

Since we started this arrangement, I've had more time to do computer things, and she has never complained about my spending too much time with "that machine." It's a very good way to save your marriage or your computer.
Timothy Sullivan
Brooklyn Park, Minnesota

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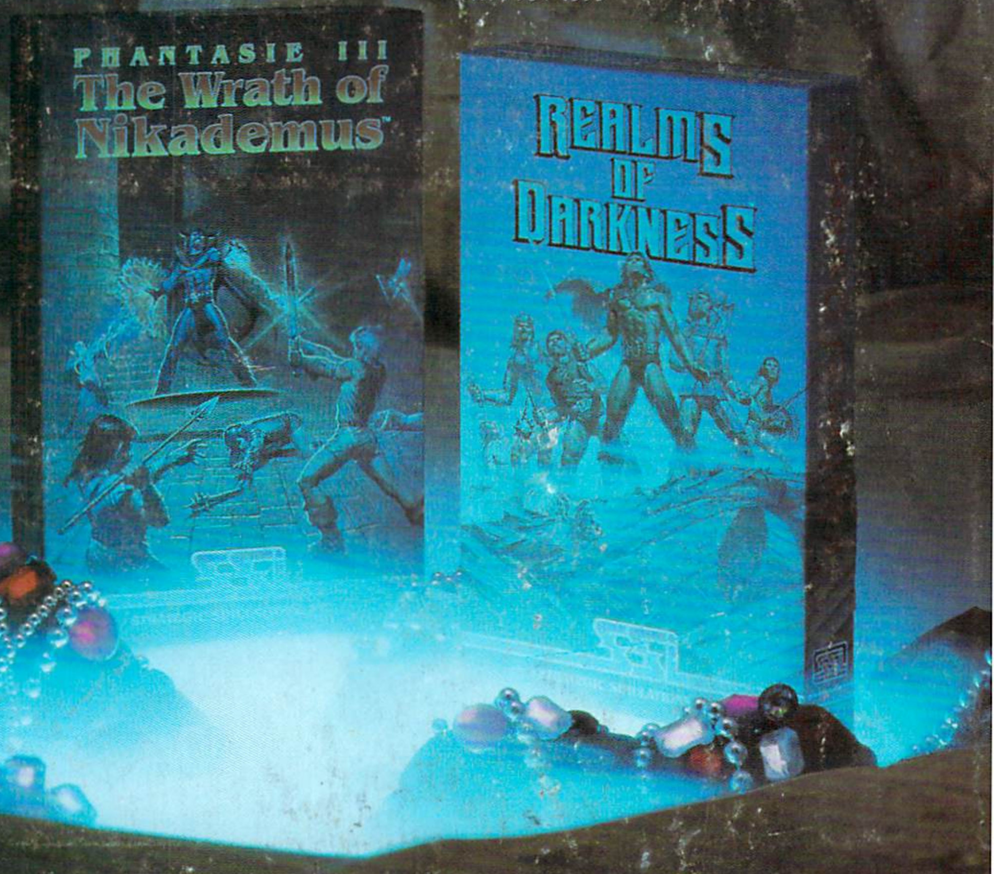
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